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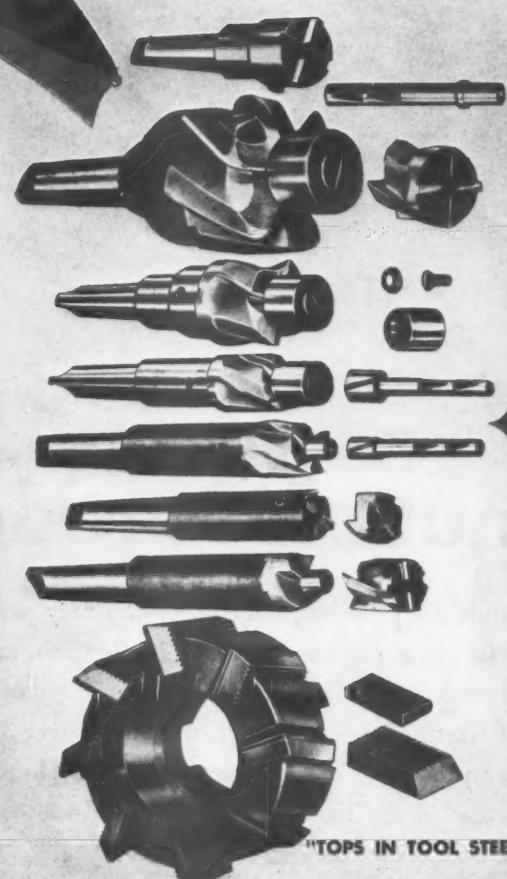
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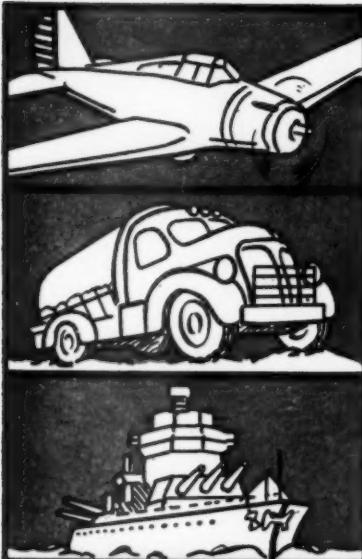
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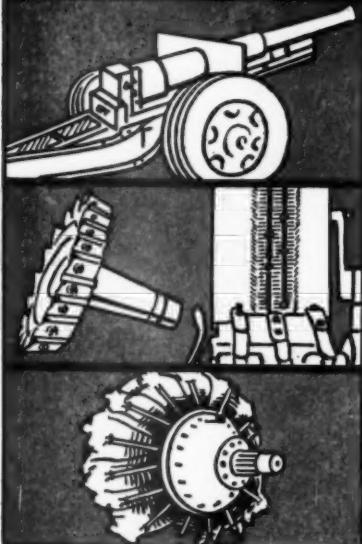
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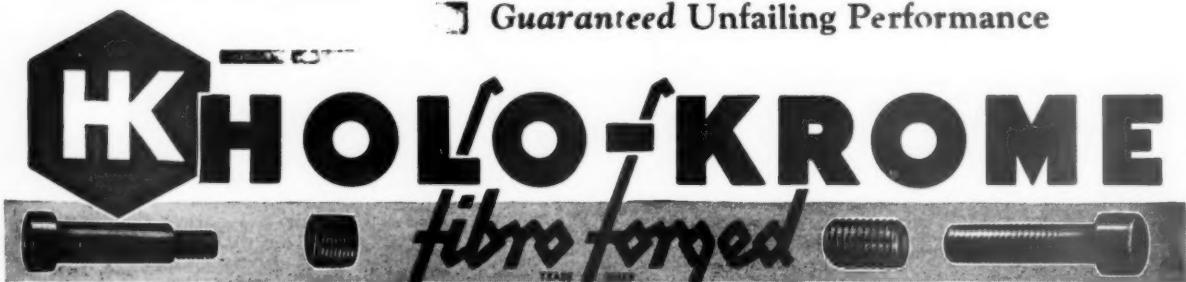
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THE TOOL ENGINEER

Volume X

MAY, 1941

Number 5

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C. A. HOOPER

The author of this month's lead article is Tool Supervisor of the Chevrolet-Flint Division of General Motors. In "Longer Tool Life" he gives the reader an insight into methods of increasing Defense Production.

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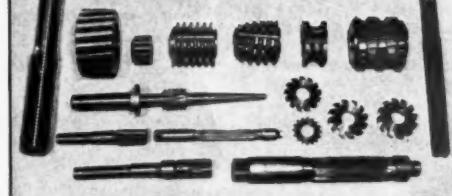
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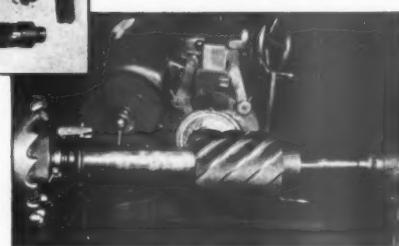
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air tools



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Rotor air tools

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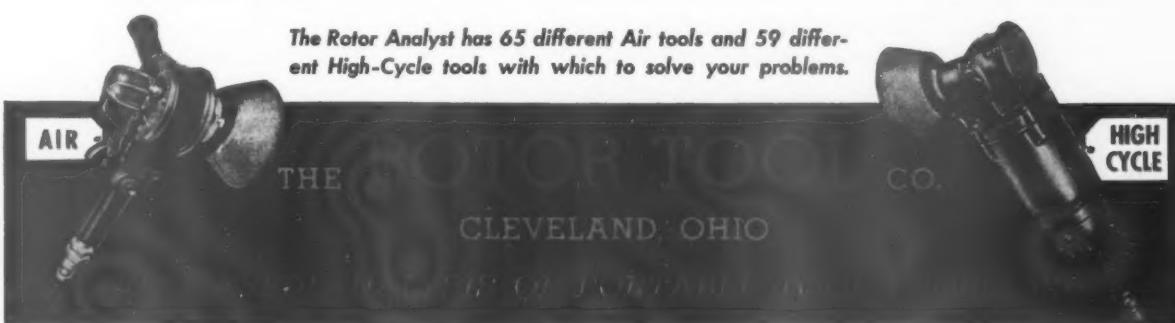
Doubled production. Brought in a trial grinder. Took off my coat and showed them how this high-speed, light-weight tool makes the sparks fly. (Photo shows me hard at it.) Boosted metal removal from 40-50 oz. per hour to 80-90 oz. per hour—about twice as much.

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Air or High-Cycle? I'd be pleased to give you practical help to study your portable tool operations and develop *faster production and lower costs*. I can bring in tools, gauges and all necessary equipment to demonstrate either Air or High-Cycle tools. I'm practical and I'm unbiased.

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The Rotor Analyst has 65 different Air tools and 59 different High-Cycle tools with which to solve your problems.

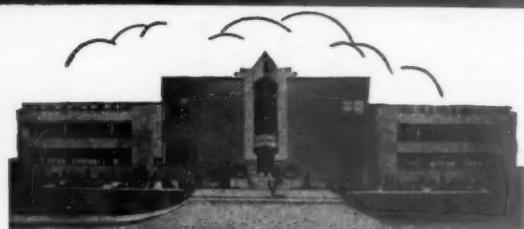


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2

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3

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THE TOOL ENGINEER

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this book..



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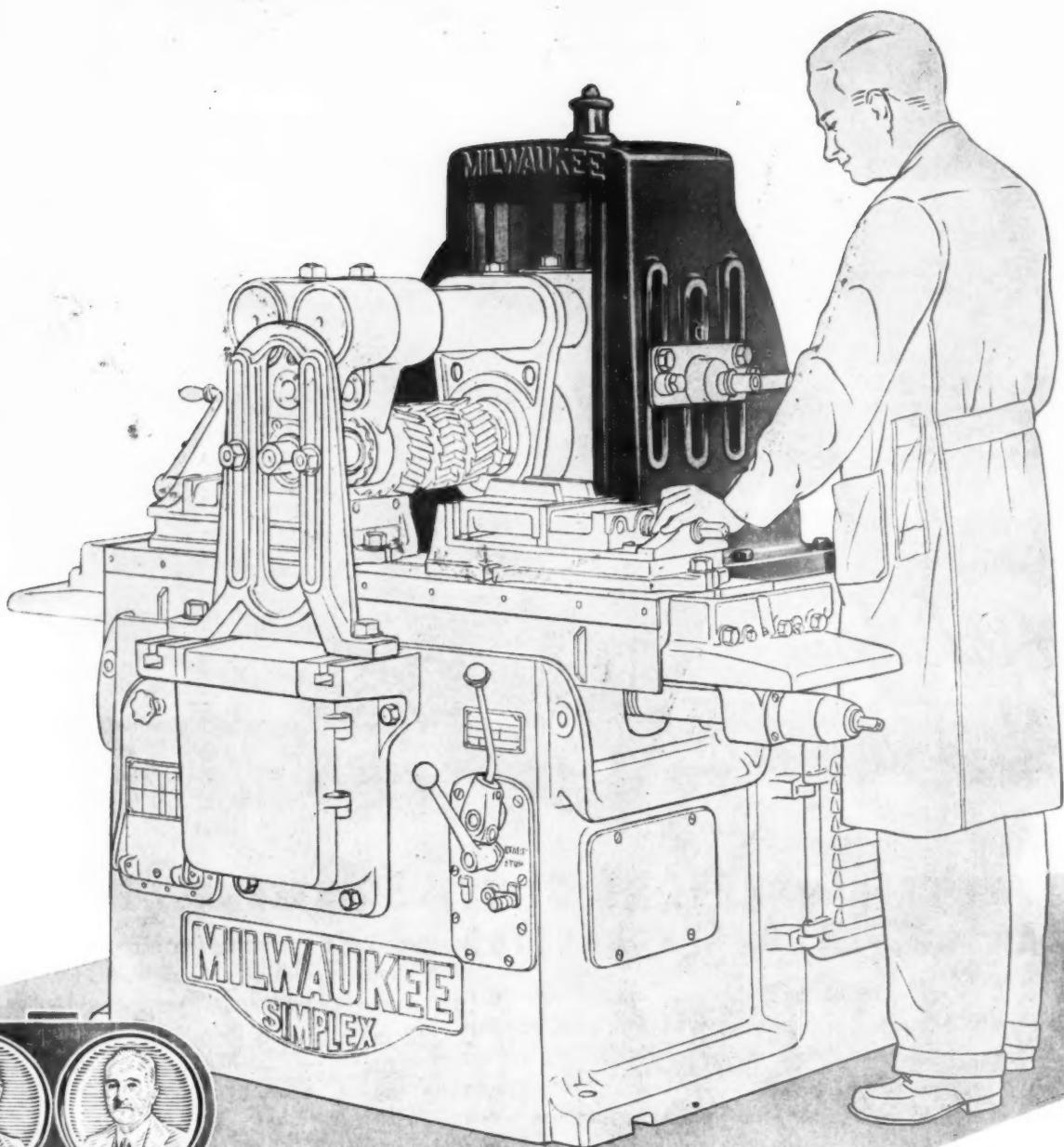
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The mounting of the spindle block — straddled by two uprights and clamped solidly together — provides a wide support base and an unusually rigid spindle structure.

KEARNEY & TRECKER CORPORATION • Milwaukee, Wis., U. S. A.



KEARNEY & TRECKER



MILWAUKEE MILLING MACHINES

LATROBE

TATMO

A NEW TREND IN
HIGH-SPEED STEELS

Producing for Defense

Latrobe Electric Steel Company, in common with industry everywhere, has expanded its production capacity to take care of primary defense needs. While such requirements naturally come first, Latrobe is cooperating to the fullest in meeting all demands.

A Low Tungsten Tool Steel for Varied Cutting Applications

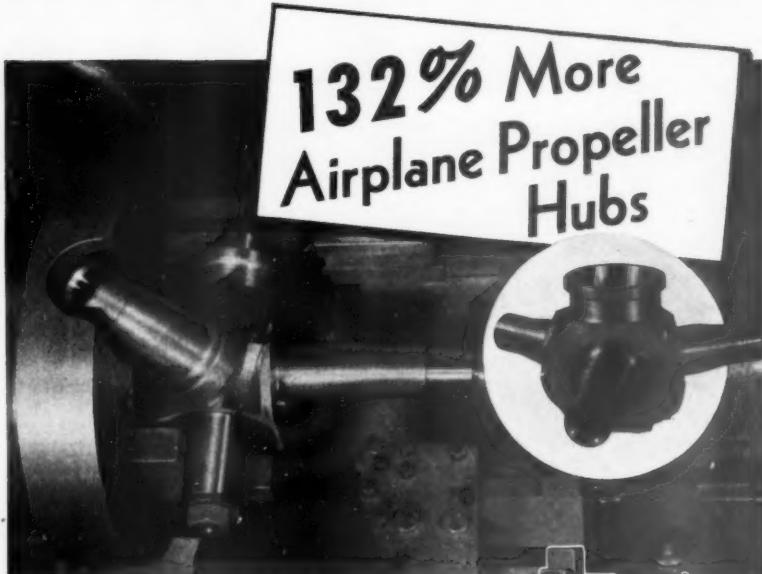
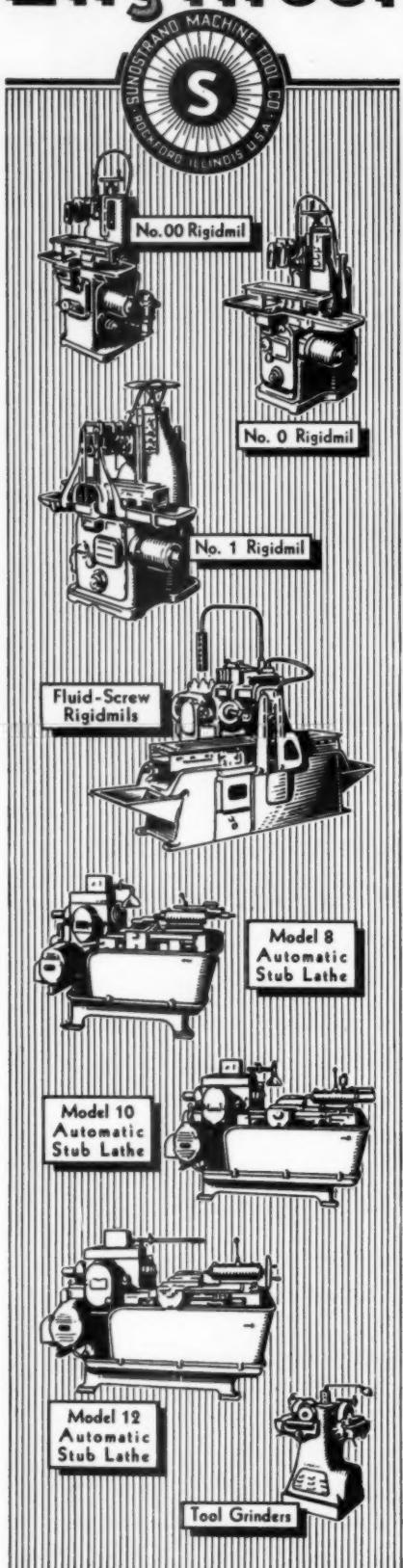
LATROBE Electrite TATMO is a high molybdenum, low tungsten high-speed steel that has proved itself a worthy replacement for high-speed steels of a higher tungsten content. It successfully combines extreme toughness with high red hardness and maximum cutting properties. You can use TATMO without sacrificing efficiency, and in many cases, with a definite gain in tool life.

THE MARK OF  BETTER TOOL STEELS
LESCO

Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES and PLANT • LATROBE • PENNSYLVANIA

Engineered Production...



Automatic Stub Lathes Increase Production And Hold Accuracy On Tough Turning

★ They wanted more production on airplane propeller hubs thus: — Tough steel forgings, about 400 Brinell; close limits on dimensions and relation to hub axis; flange dead square; mirror finish all over . . . very closely inspected. ★ A tough job, difficult to machine at all . . . yet Sundstrand Engineered Production gave them what they wanted! Putting the job on Model 10 Automatic Stub Lathe, with set-up illustrated, increased output on turning operation 132%. ★ For features and advantages of Automatic Stub Lathes which made it possible to engineer this production increase, see Bulletin 391. For reliable estimates on fast turning and milling, consult our Engineered Production department. For best delivery, get priority . . . and order now.



Sizes, cycles, and specifications of Automatic Stub Lathes are illustrated and described in Bulletin 391. Additional data sheets show high-production applications to airplane, ordnance, and munition manufacture. You can get this valuable information postpaid by return mail, write for it today.

Every member of our organization gladly makes this vow:
"I pledge allegiance to the Flag of the United States of America and to the Republic for which it stands, one Nation indivisible, with liberty and justice for all."

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Illinois, U. S. A.

RIGIDMILS • STUB LATHES

Hydraulic Operating Equipment — Centering Machines — Tool Grinders

THE TOOL ENGINEER

For Shops That Now Must **SPEED UP PRODUCTION-**



CUTTING TOOLS *That Can Take It!*

● National tools are engineered for stamina! Their long, economical life is never accidental. Engineers, metallurgists, and skilled workmen stand back of their performance in your service.

NATIONAL



MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

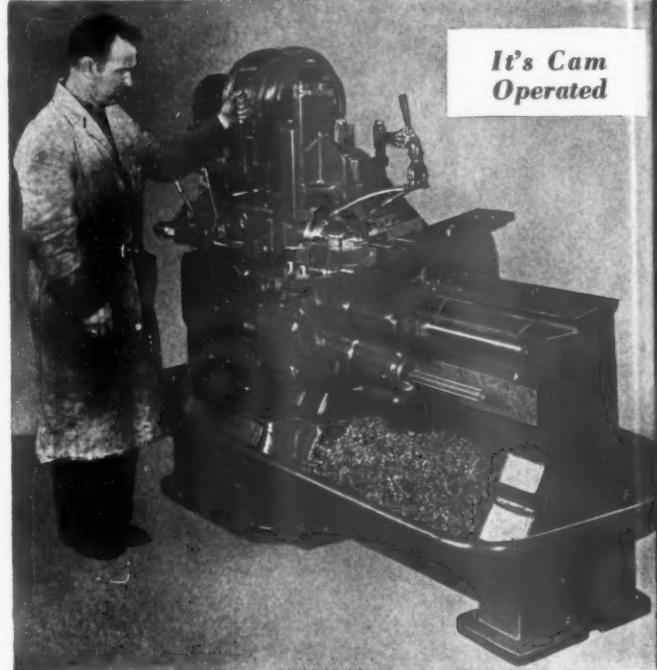
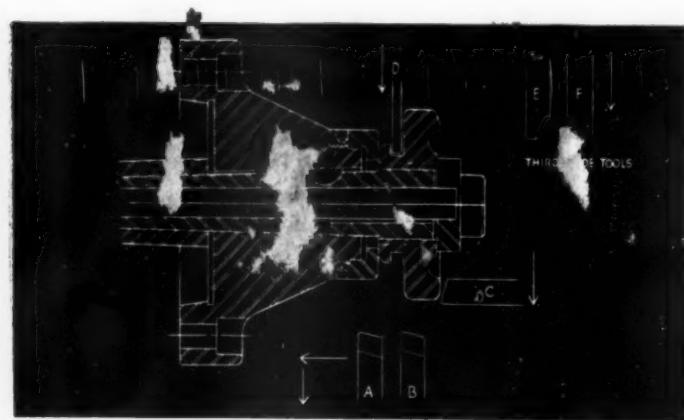
WIDE-RANGE ADAPTABILITY AND UNUSUAL TOOLING POSSIBILITIES OF THE NEW

Model LR *Lo-swing* DEMONSTRATED ON TRANSMISSION GEAR JOB

This transmission gear job, now being handled on two of the new Model LR Lo-swing Lathes, provides an excellent illustration of their wide adaptability and ability to combine several operations. Universal cams and locked timing keep all slides properly synchronized.

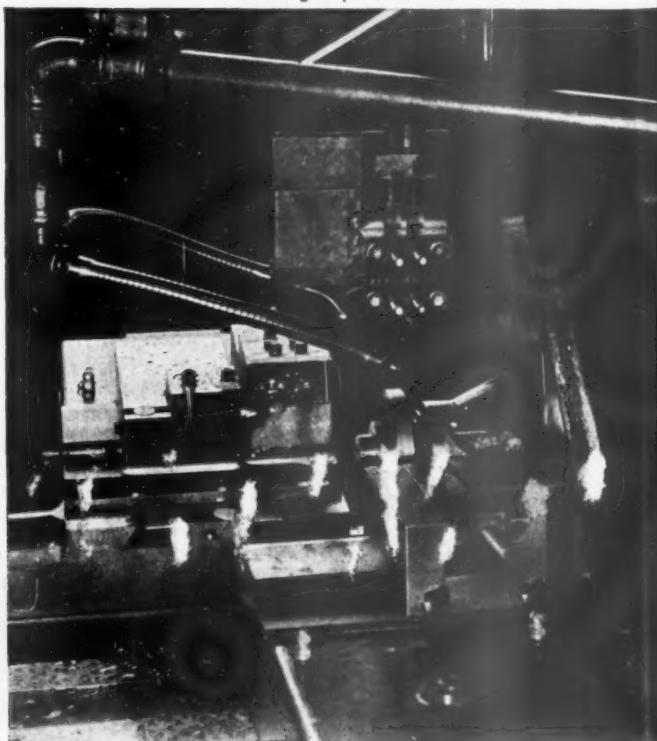
The work comes to these machines with center hole and back face finished. It is placed on a stub arbor and held by a draw-bar and "C" Washer. As the automatic cycle begins, the front carriage moves longitudinally and tools A and B (see tool layout below) rough and finish turn the OD of the gear. As the cross slide then moves out, tool C faces the outside surface. Simultaneously with the above operations tool D on the back-squaring attachment machines the groove, and tools E and F, mounted on the overhead arm, form the corners of the gear body.

High speed steel tools are used on this particular job, although the LR Lo-swing is basically designed to provide the utmost in performance with carbide tools. Another unusual inbuilt feature of the Model LR, which the above description does not mention, is its new Simplified Change-Over Mechanism which makes changing from one job to another practically as simple as setting a tool.



Above: Model LR Lo-swing Lathe equipped with Third Arm.

Below: Close-up view from rear of machine showing tooling for the gear job described.



LATHE NEWS from SENECA FALLS



Red Ring Universal Gear Testers will check index, interference, helix angle, wobble, eccentricity and tooth size of the ordinary small gear in less than a minute, making it useful for production inspection.

Operation is simple, easy—requires no extraordinary skill. Readings are to .0001".

The Red Ring Helical Gear Lead Comparator compares the lead of each tooth to that of a precision master gear, or to a master disc. Set up is simple and easy, and once the job is set up almost any workman of average skill can make the inspections.

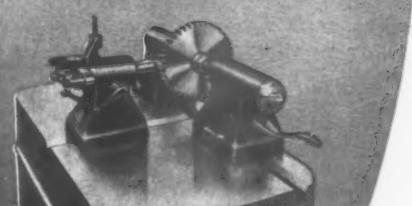
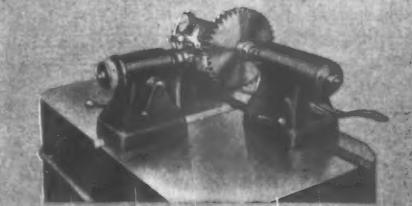
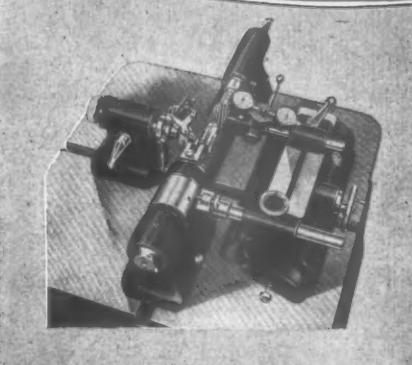
Gears integral with the shaft—arbor mounted gears—or internal gears may be checked.

Both gear testing machines are extremely sturdy, high precision instruments. They will make a large reduction in gear inspection time and cost.

Write for data on these and other Red Ring Machines.

NATIONAL BROACH AND MACHINE CO.

5600 ST JEAN • DETROIT, MICHIGAN



Carrier

Air Conditioning

Reduces Set-Up

Time to a Minimum

by the use of the unique interchangeability of
DAVIS BORING TOOLS



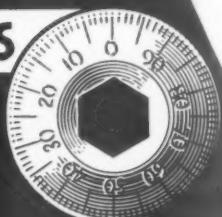
THIS photograph illustrates a very practical and efficient type of set-up for boring bearing seats in a centrifugal compressor housing The Carrier Corporation, Syracuse, N. Y., chose Davis Boring Tools for this job because of the quick and accurate interchangeability of these block type cutters This feature alone assists materially in reducing Carrier's set-up time to a minimum, as it is necessary to first bolt the housing caps in position and then run the bar through, after which the block cutters are inserted in the bar Line boring the bearing-fits in this manner is considered good practice, because the bar is supported in a saddle type fixture and piloted both in front and in rear of the work.

DAVIS BORING TOOL DIVISION
LARKIN PACKER COMPANY, INC., ST. LOUIS, U.S.A.

Send us prints of your work, helpful, specific recommendations. No obligation.

DAVIS

BORING TOOLS



THE TOOL ENGINEER.

MINITIONS

PRIORITY!

SHELLS

ARTILLERY

AIRCRAFT

BOMBS

TANKS

SHIPS

TORPEDOES

ARMOR PLATE

MACHINE GUNS

TRUCKS

SUBMARINES

Priority Orders Deserve Priority Tools

More steel is being machined today with tantalum-tungsten carbide tools than with all other kinds of tools combined.

Vascoloy-Ramet Tools are machining metal faster, saving precious time, increasing productivity of men and machines.

Now, more than ever, industry cannot afford to lose the additional production which can be gained with Vascoloy-Ramet Tools.

Call in a Vascoloy-Ramet factory representative or authorized agent and get his suggestions.

VASCOLOY-RAMET CORPORATION
NORTH CHICAGO, ILLINOIS

An affiliate of

FANSTEEL METALLURGICAL CORPORATION

and

VANADIUM-ALLOYS STEEL COMPANY

Factory-Owned Branches: Jersey City . . . Detroit . . . Cleveland
Buffalo . . . Syracuse . . . Pittsburgh . . . Cincinnati . . . Hartford
Providence . . . Philadelphia . . . St. Louis . . . Milwaukee

AUTHORIZED AGENTS IN PRINCIPAL CITIES

In Canada: Carbide Tool & Die Company, Ltd., Hamilton, Ont.



THE SUPERIOR TANTALUM-TUNGSTEN CARBIDE TOOLS

GREATES'T TIME-SAVER IN DEFENSE WORK

The sensational savings in time effected in metal working plants equipped with one or more DoAlls are easy to figure, but there are other savings, too intrinsic in value to measure—savings of energy, temper, and mental fag, when rush jobs at last move through in one-half to one-quarter the former time.

DO IT WITH A
DoAll

Speed up production—cut corners—turn out better work. Wherever metal is shaped, cut and used, the DoAll is an equipment "must". Takes the place of shaping, milling and lathe work on hundreds of jobs.

BAND FILER

Does faster, better, smoother continuous filing on all materials from high-carbon steel to brass, wood, etc. Your choice of 21 styles of file bands, $\frac{1}{2}$ ", $\frac{3}{8}$ " and $\frac{1}{4}$ " wide, flat, oval or half round.



DoAll GRINDER

A super precision surface grinder—a real production tool. Less vibration because motor is built right on the ball-bearing spindle. Work table has exceptionally large bearing surface. Hydraulic table travel is infinitely variable, up to 50 f.p.m.



Let us send a factory-trained man to your plant with a DoAll to show you what this remarkable machine tool can do for you.

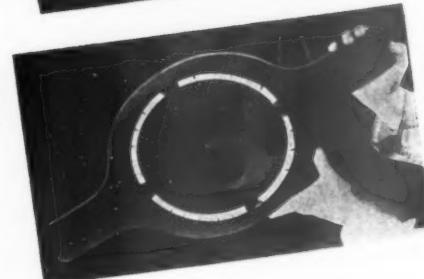
FREE—Literature and
Technical Data on
Contour Machining



Model V-36 DoAll
with 36" throat handles large and odd-shaped parts at Northwest Airlines, St. Paul.



Micrometer
These special frames sawed in 45 minutes at Northwest Airlines.



Propeller Wrench
Made at Northwest Airlines. Inside cut, 15 minutes. Outside cut, 30 minutes.

CONTINENTAL MACHINES, INC.

1304 S. Washington Ave., Minneapolis, Minn.

Associated with the DoAll Co., DesPlaines, Ill., Manufacturers of Band Saws and Band Files for DoAll Contour Machines

THE TOOL ENGINEER

IMMEDIATE SHIPMENT

On DoAll Contour Machines

Because our manufacturing facilities were increased 400% early in 1940, before the defense program started.

Because we use arc welded construction for greater speed, and have developed a process of attaching pads that have machined surfaces, which eliminates handling and machining heavy framework.

Every 40 minutes we take a DoAll off our 1,000-foot assembly line.

Like Detroit's auto plants—DoAlls are built as fast as needed—giving you higher value.

Now recognized as the indispensable machine tool, this new shape-cutting

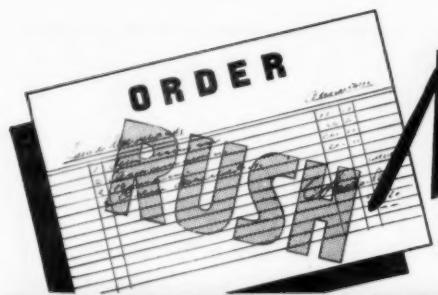
process has revolutionized machine shop practice throughout the world.

Again the progressiveness and foresight of the DoAll Organization is demonstrated in making immediate shipment to aid American industry in meeting today's demand for greater and faster production.

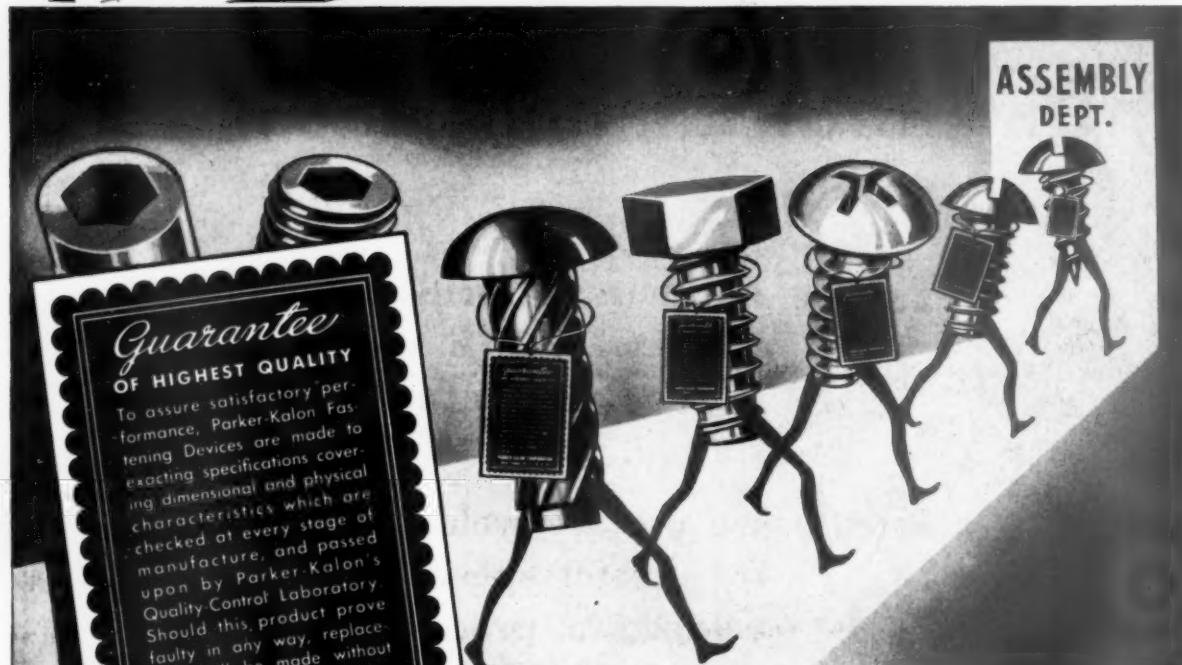
NO MACHINE TOOL "BOTTLENECK" HERE

CONTINENTAL MACHINES, INC., MINNEAPOLIS, MINN.

Associated with the DoAll Co., Des Plaines, Ill., Manufacturers of Band Saws and Band Files for DoAll Contour Machines



No Time Now for "Doubtful" Screws



**AVOID SCREWS THAT MAY EAT UP TIME —
BOOST COSTS . . . SPECIFY PARKER-KALON
QUALITY-CONTROLLED FASTENING DEVICES**

COSTS NO MORE to get
this Parker-Kalon Quality-Control
Guarantee with every box of . . .



Hardened Self-tapping Screws
Types, sizes, head-styles for every
assembly of metal or plastics

Cold-forged Socket Screws

Cap Screws, Set Screws,
Stripper Bolts made to
a new high standard
of quality

Wing Nuts-Cap Nuts-Thumb Screws
Cold-forged . . . Neater, Stronger

Now, as never before, it is important to guard against "doubtful" screws. For they can knock assembly schedules haywire! Sure, such screws may look all right. Most of them will even work all right. But it takes only a small percentage that won't go in quickly, that won't draw up tight, that strip their threads or break, to eat up a whale of a lot of time and increase costs.

So . . . protect yourself against these speed-killing "doubtful" screws! Specify Parker-Kalon Fastening Devices! There's an unequalled GUARANTEE OF QUALITY.

CONTROL in every box . . . a GUARANTEE that every Parker-Kalon Screw will go in fast and easily, and hold tight. This GUARANTEE is backed by the industry's greatest Quality-Control Laboratory . . . by Parker-Kalon's unique inspection routine which assures unvarying uniformity of mechanical and metallurgical characteristics.

Be sure of getting Fastening Devices that will "hold up their end" of assembly schedules. Specify PARKER-KALON! Parker-Kalon Corp., 190-198 Varick Street, New York, N. Y.

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

*Quality-
Controlled* **PARKER-KALON**
Fastening Devices

You can't tell King Zeero they're all alike!

They HAD to Find

"Better than Good" Socket Screws

The King Zeero Company

MANUFACTURERS OF REFRIGERATING EQUIPMENT
1885-6 KELLYBURN AVE.
Chicago, Ill.

FEBRUARY 6, 1941.

PARKER-KALON CORPORATION,
200 VARICK STREET,
NEW YORK, N.Y.

GENTLEMEN:

WE HAVE A VERY TOUGH APPLICATION FOR YOUR SOCKET HEAD CAP SCREWS. WE USE THEM FOR SECURING A FLANGE PLATE TO A STEEL BLOCK. A 1/8" THICK ALUMINUM, OR COPPER GASKET IS PLACED UNDER THE SCREW HEAD AND THE SCREW IS PULLED DOWN HARD ENOUGH TO MAKE A GAS TIGHT JOINT WITH A 250# AIR TEST.

WE STARTED USING YOUR SCREWS FOUR YEARS AGO AND ARE VERY PLEASED TO ADVISE THAT ONLY ONE SCREW HEAD BROKE OFF IN THAT TIME. THIS IS A MARVELOUS RECORD AND WE ARE PLEASED TO GIVE YOUR COMPANY A "PAT ON THE BACK" FOR PRODUCING A TRULY FINE AND UNIFORM PRODUCT.

WE HAD SO MANY BROKEN SCREW HEADS OF OTHER MAKES CAP SCREWS, WHEN A SUPPLY HOUSE SALESMAN INDUCED US TO TRY PARKER-KALON. WE BENT THE WRENCH TRYING OUT THE FIRST SCREWS WITHOUT BREAKING THE HEADS. NOTHING BUT PARKER-KALON HAVE BEEN USED BY US SINCE THAT TIME.

TAKING THIS MEANS OF EXPRESSING OUR APPRECIATION
"WE AND UNIFORMLY EXCELLENT PRODUCT, WE ARE

YOURS VERY TRULY,

THE KING ZEERO COMPANY,

BY: J. H. Morrison



PARKER-KALON'S QUALITY-CONTROL SHOWS UP . . . whenever unusual strains are imposed. This unequalled 16-point control over all mechanical and metallurgical characteristics produces an unvarying uniformity that benefits hundreds of "hard-to-please" buyers. It eliminates "doubtful screws" . . . screws that *look* right but some of which don't *work* right, causing costly, time-consuming trouble . . . rejects and customer complaints. Specify PARKER-KALON and be sure! Parker-Kalon Corporation, 190-198 Varick Street, New York.

PARKER-KALON

Quality-
Controlled

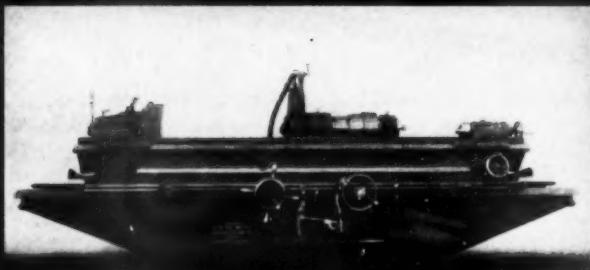
SOCKET SCREWS

25,000th NORTON MACHINE



Congratulations on completion of 25,000th
Norton Machine

[For Management: Howard W. Dunbar. For Shop:
Chief Inspector Thomas S. Barter]



Charles H. Norton's No. 1 Cylindrical Grinding Machine
went to R. Hoe & Co., Brooklyn, in 1901—now in
Edison Institute, Dearborn, Mich.

Comes off the Assembly Line

ON MARCH 15 Norton Machine No. 25,000 came off the assembly line—bound for an airplane motor plant to play its part in the Defense Program.

Twenty-five thousand is not a large number when you think of automobiles or radios or other consumer products but in the Machine Tool Industry it is a figure to be proud of. It took many man-hours of skilled labor to produce these 25,000 Norton machines. Their operation in industry the world over has provided thousands of hours of work for thousands of men.

It was just forty years ago that Charles H. Norton's first cylindrical grinding machine revolutionized grinding, making it for the first time a production-precision machining operation instead of a light finishing operation for small parts.

Production Increased 300%

Norton Grinding and Lapping Machines are now produced at a rate that is approximately four times that of 1937, the previous peak year—an increase of 300%.

Five important steps have been largely responsible for the increase: (1) Use of assembly lines, (2) Farming-out of work, (3) Making available for manufacturing purposes every possible foot of floor space, (4) Leasing an outside building, (5) An extensive well-planned training system.

The assembly line has probably done most to speed production because by this method of manufacture machines are turned out with greater facility and speed.

Thus, without sacrificing quality, quantity production is now an accomplished fact at Norton.

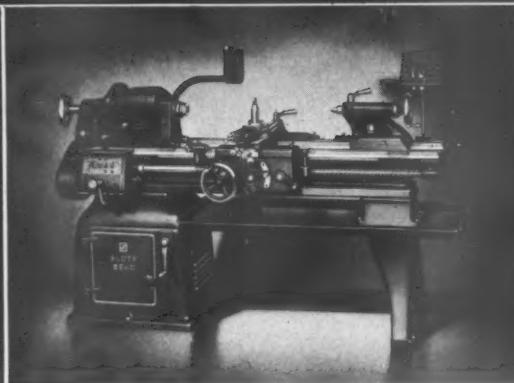
NORTON COMPANY
Worcester, Mass.

M-436A

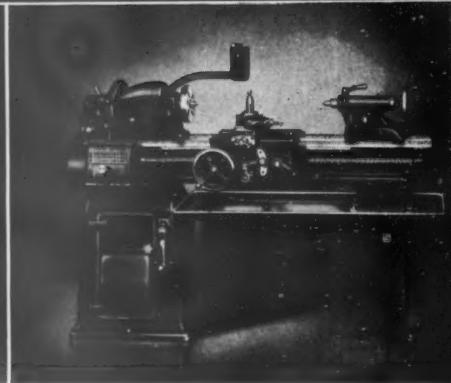
The RIGHT Lathe For Every Shop Need



16" swing South Bend Underneath Motor Drive Quick Change Gear Precision Lathe.



14½" swing South Bend Tool Room Underneath Motor Drive Precision Lathe.



13" swing South Bend Underneath Motor Drive Quick Change Gear Precision Lathe.



10" swing 1" Collet South Bend Tool Room Underneath Motor Drive Precision Bench Lathe.



10" swing 11/16" Collet South Bend Underneath Motor Drive Quick Change Gear Precision Lathe.



9" swing Model A South Bend Workshop Quick Change Gear Precision Bench Lathe.

THE importance of selecting the *Right* lathe for every shop need is emphasized today by the demand for increased production resulting from our national emergency. Maximum production at minimum cost can be attained only when the lathe is matched perfectly with the job.

Consider the work to be done, then choose the size and type of lathe that will give the most efficient service. Remember that versatility and precision are important in a tool room lathe. For manufacturing operations, a lathe must also have plenty of power, speed, and stamina.

South Bend Lathes are made in a variety of sizes and types that will efficiently handle a wide range of metal working requirements. They can be supplied with equipment for precision tool room work, manufacturing operations, general machine work, and for many special classes of service.

Consult our Engineering Department about the lathe best suited to your work. We do no special tooling, make no special machines, but we will gladly give you our recommendation. A copy of our new Catalog No. 100A describing all sizes and types of South Bend Lathes will be sent on request.

ON DISPLAY IN ALL PRINCIPAL CITIES

BALTIMORE, MD.—Carey Machinery & Supply Co.
BOSTON, MASS.—South Bend Lathe Works †
BRIDGEPORT, CONN.—A. C. Bisgood
BUFFALO, NEW YORK—R. C. Neal Company, Inc.
CHICAGO, ILL.—South Bend Lathe Works ‡
CLEVELAND, OHIO—Reynolds Machinery Co.

† BOSTON Sales Office: 67 Broadway, Kendall Square, Cambridge, Mass., Phone Trowbridge 6369.

HOUSTON, TEX.—Wessendorff, Nelms & Company
LOS ANGELES, CAL.—Eccles & Davies Mach. Co.
MILWAUKEE, WIS.—W. A. Voell Machinery Co.
NEWARK, N. J.—J. R. Edwards Machinery Co.
NEW ORLEANS, LA.—Dixie Mill Supply Co., Inc.
NEW YORK, N. Y.—A. C. Colby Machinery Co.

‡ CHICAGO Sales Office: Room 308, Machinery Sales Building, Phone State 7283.

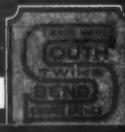
PHILADELPHIA, PA.—W. B. Rapp, Machinery
PITTSBURGH, PA.—Tranter Manufacturing Co.
PROVIDENCE, R. I.—Geo. T. Reynolds & Son
ROCHESTER, NEW YORK—Ogden R. Adams
SAN FRANCISCO, CAL.—Moore Machinery Co.
YORK, PA.—York Machinery & Supply Company



SOUTH BEND LATHE WORKS

LATHE BUILDERS SINCE 1906

478 E. Madison St., South Bend, Ind., U.S.A.



TO EXTRA PLANT CAPACITY

*Take the Road
that's marked!*

It makes the going easier and safer—and gets you there more quickly—when you take the road that's marked.

And today the road to Extra Plant Capacity through improved tools is plainly marked.

Four great Carpenter time-savers point the way. All four have grown out of Carpenter research into the practical problems of tool steel selection and heat treatment. All four are part and parcel of Carpenter's vital program of "All Aid To Tool Makers." All four are vital safe-guards along the Road To Better Tools.

In more than 1,000 plants, they are helping reduce the time spent by skilled tool makers in the non-productive work of repairing and maintaining tools. They are also at work preventing excessive interruptions to production caused by premature failures—and thus are increasing machine output and plant capacities.

Carpenter research has marked the road—and will continue to straighten curves and eliminate grade crossings on the route to extra capacity in the tool room and the plant. As always, Carpenter customers will be the first to benefit.

If you would like to know more about the marked road, write on your company letter-head for the Carpenter "Time-Saver" which most closely suits the particular needs of your job.

For Executives. Booklet telling how to find Extra Capacity hidden in your plant. 14 minutes of interesting vital reading. Practical program outlined for improving tool performance. Free to tool steel users in U. S. A.

For Tool Design and Tool Room. 20" by 30" Matched Tool Steel Selector Wall Chart for use in specifying correct steels for new tools—and for trouble-shooting when difficulties arise on old tools. Free to tool steel users in U. S. A.

For Tool Room Foreman and Tool Hardening. A 159-page manual with detailed heat treating data, hardening instructions, and a comprehensive explanation of the Matched Set Method of Tool Steel Selection. Free to tool steel users in U. S. A.

For "Refreshing" Skilled Tool Makers and Training Apprentices. More than 18,000 copies of this comprehensive text book are in use by expert tool makers, tool engineers, vocational schools and apprentice tool makers. Ideal to meet present training problems. Price \$1.00 in U. S. A.



Carpenter MATCHED TOOL STEELS

THE CARPENTER STEEL COMPANY READING, PA.

“LOGAN”

MANUFACTURES A COMPLETE LINE OF AIR AND HYDRAULIC EQUIPMENT AND CONTROLS

- Chucks
- Cylinders
- Valves
- Presses
- Hydraulic Power Units
- “Sure Flow” Coolant Pumps
- Other Allied Devices

LOGANSPORT MACHINE, INCORPORATED

902 Payson Road Logansport, Indiana

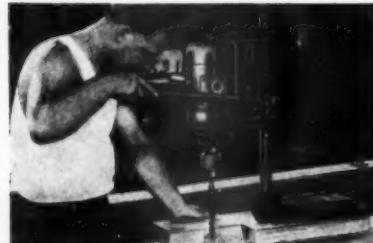
A nearby “Logan” Representative will be glad to make recommendations on your own requirements.



Is "Waiting For Big Machines" Stifling Your Production?



STANLEY ELECTRIC DRILLS include 15 different models, with capacities from $\frac{3}{16}$ " to $\frac{7}{8}$ " in steel. Heavy, rugged tools that will do the work of a Drill Press, when mounted in a Stanley Bench Stand.

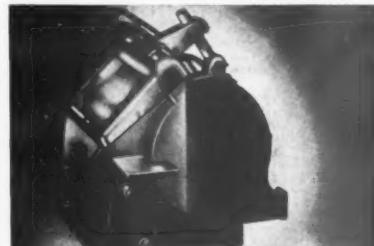


RUGGED UNIVERSAL MOTORS, long-life gears and oversize bearings are features of Stanley Electric Drills. Aluminum alloy housings are free of obstructions. All models are balanced for easy use.

Take a little time to check operations against the complete line of Stanley Electric Tools, and you'll probably find that many drilling, grinding, sheet-cutting, and assembling jobs can be done right now with Stanley Electric Tools, without waiting for big machines! * * Ready for delivery, low in cost, this line includes Stanley Unishears, for rapid cutting of sheet materials; Tool Room, Contour, Bench and heavy Portable Grinders; Electric Hammers, Drills, Screwdrivers and Saws. Get those jobs under way! Ask your Stanley distributor for demonstration, or write for literature. Stanley Electric Tool Division, The Stanley Works, 149 Elm St., New Britain, Connecticut.



FAST ASSEMBLY is the byword in plants where Stanley Electric Screw Drivers are on the job. "Adjustable Tension Clutch" is set to release at desired tension—an exclusive Stanley feature.



30% MORE VISIBILITY—New Stanley "FLUD-LITE" Safety Eye Shield has $6'' \times 4''$ window of safety glass. Two long-life frosted bulbs give ample, shadowless lighting. Guard is adjustable from horizontal to a 45° angle for use standing or sitting.

STANLEY
Electric Tools

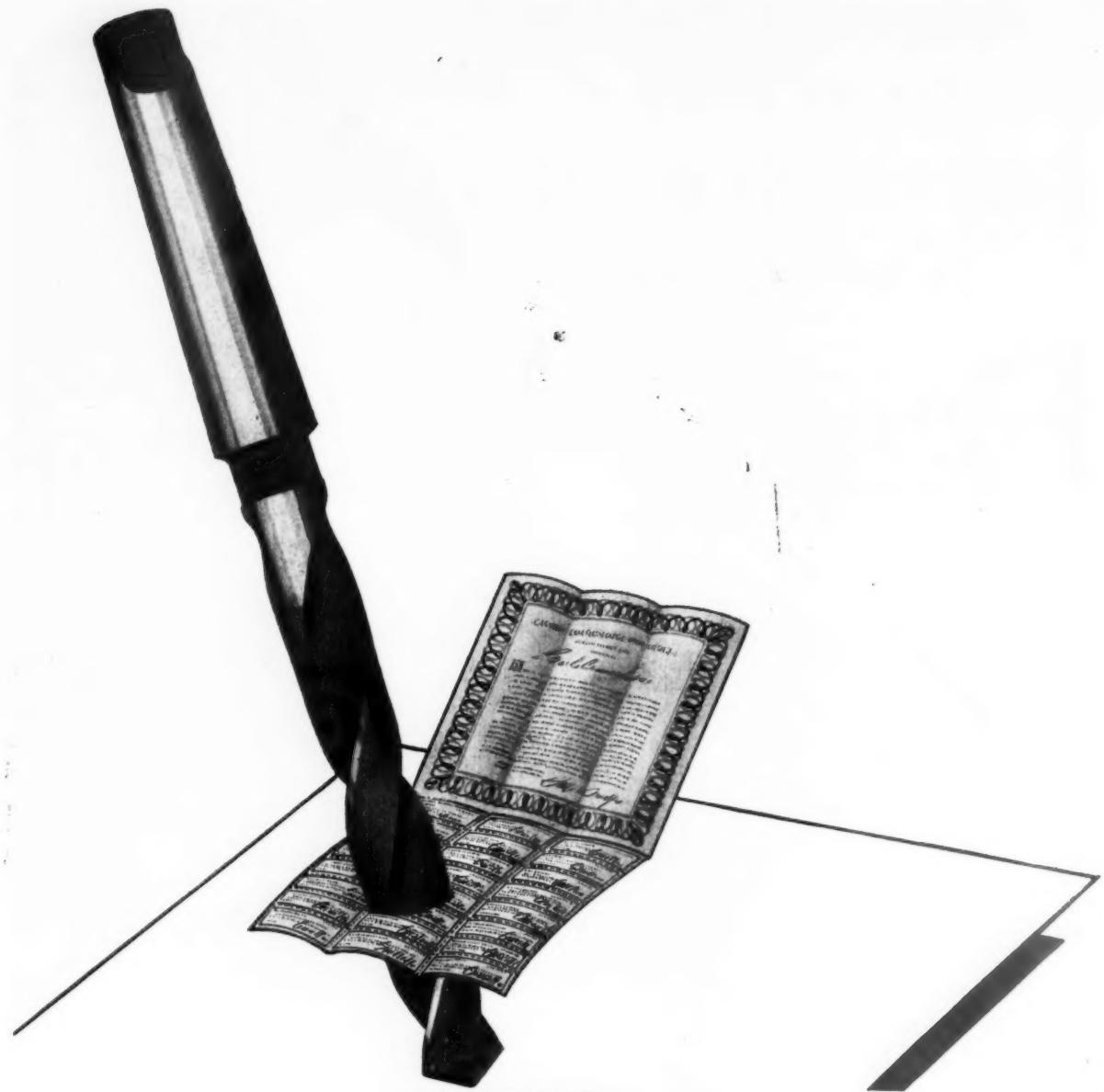
Use the power of
impounded facts
to speed defense!

Nickel

Time-proved answers to your questions about Nickel alloyed materials are quickly available. From information assembled through years of research and field studies, The International Nickel Co., Inc. have compiled and condensed essential facts into convenient printed form.

Now...when minutes and materials have become so vital to defense efforts...make full use of this experience. Send for a check list of helpful printed pieces on the selection, treatment, fabrication and use of Nickel alloys, or send specific questions to:

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK, N. Y.



"INTEREST" ON YOUR INVESTMENT...

To be sure your new, high-speed, high-production equipment will repay you for its installation, give your operators the benefit of highest quality cutting tools at the workhead, where production is determined.

MORSE

THERE IS A
DIFFERENCE

**TWIST DRILL AND
MACHINE COMPANY**
NEW BEDFORD, MASS., U.S.A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - - CHICAGO STORE: 570 WEST RANDOLPH ST.

Need **FASTER** Delivery on Carbide Tools?



THIS may be your answer to the problem of getting carbide tools on the job faster!

The 10 styles of Carboloy Standard Tools and the 2 styles of standard blanks, shown above, represent a standardized line of carbide tools and tips being constantly produced in large quantities and added to stock by Carboloy.

Designed for universal use on 80% of all turning, boring, facing applications on steel, cast iron, aluminum, brass, etc., Carboloy standard tools provide not only faster deliveries but also maximum economy, easy ordering and simplified stocks.

Introduced last Fall—and recently supplemented with 5 NEW styles—thousands of Carboloy Standard Tools have been shipped from stock each week for 32 weeks in continuously increasing quantities.

These standard tools may be the answer to your carbide tool requirements. Write for revised catalogue GT-129 containing complete prices and specifications.

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Look for this triangular trade mark on tools you buy. It is your assurance of genuine Carboloy cemented carbide.

FOR EMERGENCY TOOLING ... MAKE YOUR OWN

Order Standard Carboloy Blanks—available for rapid delivery. You mill or grind a recess in your tool shank—and braze in the standard Carboloy blank. Then grind—as easily as you now REGRIND—and the tool is ready for use. Complete instructions furnished.

*Send for new
Catalogue*



**CARBOLOY STANDARD
TOOLS & BLANKS**

Speed

»» DEFENSE TODAY AND
PROTECT PROFITS TO-
MORROW WITH »»

JONES & LAMSON ADAPTABLE EQUIPMENT

No time must be lost in arming America. No time need be wasted designing and building special machines for work that can be done to better advantage on standard Jones & Lamson Turret Lathes, Fay Automatic Lathes, Comparators, Automatic Thread Grinding Machines and Automatic Opening Die Heads. Then, in future years, when this emergency is over and special machines are scrapped and written off, your Jones & Lamson equipment can be adapted easily, quickly and cheaply to earning welcome profits on production work. That's why it will pay you now and reward you later to put your production problems up to Jones & Lamson engineers.

PROFIT PRODUCING



MACHINE TOOLS

JONES & LAMSON MACHINE CO. SPRINGFIELD, VERMONT, U. S. A.

Manufacturers of Saddle & Ram Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Double-End Milling & Centering Machines . . . Automatic Thread Grinding Machines . . . Comparators . . . Tangent and Radial, Stationary and Revolving Dies and Chasers

FAY AUTOMATIC LATHES



AUTOMATIC THREAD
GRINDERS



OPTICAL COMPARATORS



AUTOMATIC OPENING
DIE HEADS



THEY GAVE ME
2 WEEKS TO MAKE NEW
DRAWINGS...I HAD THEM
READY IN 4 DAYS

"I SMILED when the Chief Engineer handed me his notes at the end of the conference with the Production Chiefs. When he said, 'Bill, have your draftsmen make these changes . . . corrected drawings must be ready in two weeks,' I knew I would give him and the rest of the boys a big surprise.

"For years we've had the same problem of rushing out drawings on new models. Last minute changes demanded by the production department always proved a Jonah . . . disrupted the whole drafting department for weeks.

"But I knew it was going to be different this time. Now, with an Ozalid machine installed right in the drafting room, we were all set to make changes in a hurry.

"What a time-saver for a drafting department, I thought, as I realized we were going to cut our drafting time from weeks to days. Here's how we did it.

"We made Ozalid transparent duplicates of all drawings to be revised . . . deleted that part of the design to be changed with Ozalid Corrector Fluid . . . drew in corrected details and specifications in pencil. Result . . . altered transparent prints which actually are new originals . . . prepared in a fraction of the time required to make the same changes by the Van Dyke Process or by retracing.

"But how do you like this—when I handed the complete job to the Chief Engineer 10 days ahead of schedule, he never batted an eye. I couldn't understand it, and it wasn't until later that I found out he knew about the Ozalid Process all along and had told one of the boys to put me wise to the savings possible with an Ozalid installation. Was my face red!

"Let me give you Chief Draftsmen some sound advice: Don't make the same mistake I did. Don't wait until the Boss gives you a hint before you investigate the short cuts in drafting possible with Ozalid transparent duplicates. Don't delay. Get the facts today."

SPECIFY *Ozalid*
WHITEPRINTS

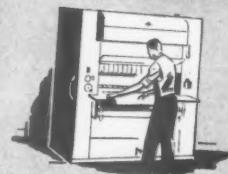
OZALID PRODUCTS DIVISION

GENERAL ANILINE & FILM CORPORATION
JOHNSON CITY, N. Y.

Ozalid in Canada • HUGHES OWENS CO. LTD., Montreal

Advantages of OZALID TRANSPARENT DUPLICATES OVER VAN DYKE NEGATIVES

OZALID

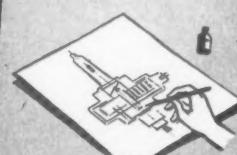


Ozalid transparent duplicates save retracing and are made in 2 easy steps with standard equipment in the same simple manner as Ozalid whiteprints.

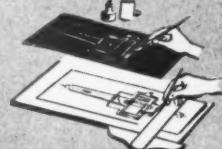
VAN DYKE



Van Dyke negatives are made in 5 steps by a method that requires much space and is complicated by the use of running water, special trays, printing frames and drying areas.



Any part of the detail on an Ozalid transparent duplicate can be deleted with Ozalid Corrector Fluid. Changes or additions can be made on the same print with either pencil or ink taking only one-quarter to one-third the time required to make similar changes by the Van Dyke method.



Changing a Van Dyke negative is a complicated process requiring opaque, paint brush and a corrector fluid which is often unsatisfactory. Practical results are usually secured only when the changes are "blocked out" on the Van Dyke negative and another positive Van Dyke or photo cloth copy is made and reworked.



Ozalid transparent duplicates are true-to-scale and are permanent. They do not deteriorate with age.



Van Dyke negatives are subject to distortion and unless properly dried often become brittle.



The speed when printing from an Ozalid transparent duplicate is 3 to 5 times faster than the printing speed possible with a Van Dyke negative.





THE RECOGNIZED SYMBOL OF Precision

There's only one standard at Ex-Cell-O...the making of the finest precision machines and tools that the most highly trained engineers and craftsmen can produce. This is why the Ex-Cell-O symbol—whether on a large machine like a thread grinder or on a small cutting tool like a counterbore—is positive assurance of a precision built product to do a real precision job.

EX-CELL-O CORPORATION • DETROIT, MICH.



● Ex-Cell-O produces **THREAD GRINDING, BORING** and **LAPPING MACHINES, CARBIDE TOOL GRINDERS, GRINDING SPINDLES, HYDRAULIC POWER UNITS, BROACHES, CUTTING TOOLS, DRILL JIG BUSHINGS** (Ex-Cell-O Automatic Thread Grinder No. 33
—one of eight styles—shown to right).

EX-CELL-O CORPORATION
1204 Oakman Blvd., Detroit, Mich.

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EX-CELL-O
Precision

MACHINES
AND TOOLS

BARNES
BETTER Hack Saw
BLADES

Nation



No. 2 IN THE SERIES OF LINCOLN PARK *Firsts*



In 1936

This Was An Achievement
In GAGE MAKING

Of course, it looks like any other plug gage, but this was a Carboloy gage made five years ago. Those were the days when cemented carbides were first being used in the manufacture of gages, and the

Lincoln Park Tool and Gage Company was a pioneer in this type of work.

Lincoln Park learned then how to work with this wear-resistant material. Using it constantly ever since for all types of precision applications, this company has, for the past few years, been the largest user of Carboloy for the manufacture of gages and many non-cutting precision tools.

Like thousands of other manufacturers, you undoubtedly will use more and more cemented-carbide gages and non-cutting precision tools in the future. Then—as now and over the past five years—you will find Lincoln Park a thoroughly dependable source for products of this nature.



LINCOLN PARK TOOL and GAGE CO.

LINCOLN PARK, MICHIGAN

Because *they reduce the cost per piece machined—*

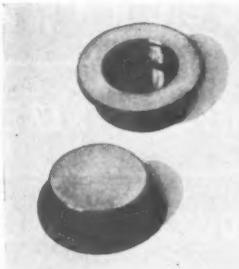


WHEEL HUB—Rough- and finish-turning and rough- and finish-boring the counterbore of a high-carbon cast steel wheel hub, with Haynes Stellite J-Metal cutting tools at a speed of 64.5 surface feet per minute with .017 in. feed for roughing and .009 in. for finishing.

**HAYNES STELLITE "J-METAL" CUTTING
TOOLS are STANDARD on these
Steel Jobs...**



BRAKE DRUM—Rough- and finish-turning a cast steel brake drum with Haynes Stellite J-Metal tools. The roughing speed is 91 surface feet per minute with $\frac{3}{16}$ in. depth of cut and $\frac{1}{32}$ in. feed per revolution. For finishing, the job is run at 261 surface feet per minute, with $\frac{1}{32}$ in. depth of cut and $\frac{1}{32}$ in. feed per revolution.



HAYNES STELLITE SPECIALTIES

These valve stem caps for diesel engines are made of Haynes Stellite alloy for resistance to heat and abrasion. Haynes Stellite specialties can be supplied—either rough or finished to your specifications—for use wherever abrasion, corrosion, or heat are encountered. Write for information.



HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York, N. Y.



Kokomo, Indiana

District Offices: Chicago, Cleveland, Detroit, Houston,
Los Angeles, New York, San Francisco, Tulsa.



Red-hard, wear-resisting alloy of cobalt, chromium, and tungsten

STEEL GEAR BLANK—Rough- and finish-facing and boring a steel automobile bevel driving gear blank with Haynes Stellite J-Metal tools. Speed, 210 surface feet per minute. The steel is forged SAE-5120, of 143 Brinell hardness.

• HIGH-PRODUCTION METAL-CUTTING TOOLS •

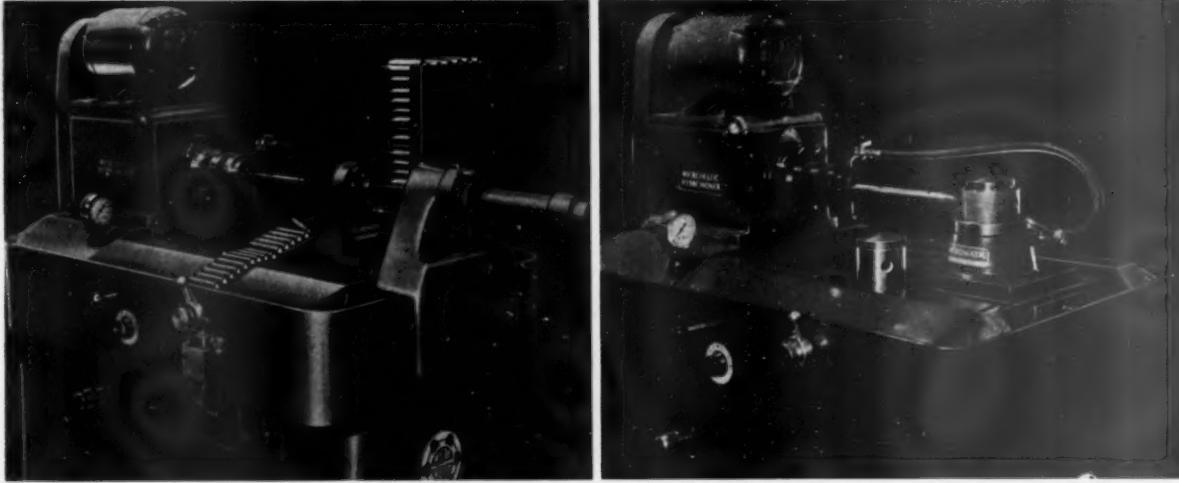
"Haynes Stellite" is a registered trade-mark of Haynes Stellite Company.

MAY, 1941

Now—

COMPLETELY AUTOMATIC HONING *with* **AUTOMATIC MICR-O-SIZE CONTROL**

One completely automatic Microfinish operation removes from .0015" to .0025" stock from reamed **VALVE STEM GUIDES** at the rate of approximately 200 pieces per hour. Uniform size is generated within .0005" and bore accuracy within .0001" to .0002" limits.



THE HYDROHONER



Microfinish for Combined Accomplishment in One Process

The Automatic Micr-O-Size Control Unit generates accurate sizing, in high production, uniformly within limits from .0002" to .0005", reducing the tolerance range and number of selective fits. It offers increased production through simplified practice. It is provided with an unique feature: visual dials for set-up, adjustment, and complete operating control. Additional features comprise:

- Instantaneous abrasive expansion only to average rough bore size—by hydraulic pressure control—and thereafter positively restrained against any backlash; followed by—
- A controlled, uniform rate of abrasive expansion feed-out to uniform size and finish—under variable pressure, hydraulically actuated control, synchronized with an adjustable time cycle, and,
- Expansion collapse of the abrasive members always to the same starting diameter—under mechanical control—and automatic compensation for average stone wear.

This equipment, for the first time in honing makes completely automatic operation successful, in high production as shown above left.



**MICROMATIC
HONE CORPORATION**

1345 East Milwaukee Ave.
DETROIT, MICHIGAN, U.S.A.

ACCURACY



UNIFORM SIZE



STOCK REMOVAL



SURFACE FINISH



PROCESS SAFETY



INTERNAL



EXTERNAL



DON'T SACRIFICE ACCURACY FOR SPEED...

Today, American Industry demands machines with speed . . . machines fast enough to keep up with the rapid pace of our National Preparedness Program. But also important is the quality of work turned out. In the rush to build up America's Defenses second to none, we cannot lower our high standards of precision and accuracy.

With Greenlee 4 and 6-Spindle Automatic Screw Machines, you can be sure of accuracy with your speed . . . fast production turned out right every time to meet your most rigid specifications. Fast . . . easy to operate . . . less down time . . . greater tooling capacity . . . quick change over . . . a rigid, positive-driven tool slide easily adjusted by a dog on the worm wheel . . . sturdy, rugged, cross-slides . . . two sets of Double-Timken Bearings for each spindle . . . accurately-ground collets of the stationary type . . . are but a few of the Greenlee features which can give you maximum production and dependable continuous accuracy.

Described here are a few parts being turned out on Greenlee 6-Spindle Machines. These production records are typical everyday examples of what hundreds of manufacturers throughout the country are doing with the Greenlee. For a detailed estimate on the production of your own pieces, send data.

GREENLEE BROS. & CO.
ROCKFORD, ILLINOIS

CHECK THESE JOBS



1 NAME OF PART—Pinion Nut for Automobile Starter.

MACHINE—Greenlee 1½" Six-Spindle Automatic.
MATERIAL—15½" Hexagon Cold-drawn S.A.E. 1112 Steel.

PRODUCTION TIME—13½ seconds or 266 pieces per hour per machine.
ACCURACY—Outside diameter held to tolerance of plus or minus .001. Counterbore reamed to a tolerance of plus or minus .0005. Long reamed hole held to a plus or minus .001.

OPERATIONS—1st Position: Hole drilled one-third of depth, and outside rough formed. 2nd Position: Hole drilled for two-thirds of depth. 3rd Position: Hole is finished drilled. 4th Position: Hole chamfered to remove any burrs in edge of hole. 5th Position: Hole reamed and outside finished formed. 6th Position: Counterbore in the front face reamed and piece is cut off.



2 NAME OF PART—Fuse Body (Small Part).

MACHINE—Greenlee 1" Six-Spindle Automatic.
MATERIAL—1½" Round Commercial Yellow Brass.

PRODUCTION TIME—6 seconds or 600 pieces per hour per machine.
ACCURACY—Machined to meet strict Government specifications.

OPERATIONS—1st Position: Rough form and drill for small tap. 2nd Position: Finish form and face, counterbore, and bore for large tap. 3rd Position: Shave and recess bottoms of two tap diameters. 4th Position: Roll threads and drill small hole. 5th Position: Tap large hole. 6th Position: Tap small hole and cut off.



3 NAME OF PART—Fuse Body (Large Part).

MACHINE—Greenlee 1½" Six-Spindle Automatic.
MATERIAL—1½" Round Commercial Yellow Brass.

PRODUCTION TIME—6 seconds or 600 pieces per hour per machine.
ACCURACY—Machined to meet strict Government specifications.

OPERATIONS—1st Position: Rough form and drill for tap. 2nd Position: Finish form and drill small hole. 3rd Position: Shave and recess. 4th Position: Thread. 5th Position: Roll threads and counterbore. 6th Position: Tap and cut off.



4 NAME OF PART—Coupling Nut for Airplane Motor.

MACHINE—Greenlee 1" Six-Spindle Automatic.
MATERIAL—1" S.A.E. X1112.

PRODUCTION TIME—18 seconds or 200 per hour per machine.
ACCURACY—Depth held to .005 total variation.

OPERATIONS—1st Position: Drill the $\frac{3}{16}$ " hole, $\frac{5}{8}$ " deep and form the long front end. 2nd Position: Drill the $\frac{3}{16}$ " hole to $1\frac{1}{4}$ " depth and shave formed part for finish and accuracy. 3rd Position: Complete drilling of $\frac{3}{16}$ " hole to depth of $1\frac{3}{8}$ " and form the short end of the nut. 4th Position: Finish form short end and drill $\frac{1}{4}$ " hole to depth of $\frac{1}{4}$ ". 5th Position: Front end of the $\frac{3}{16}$ " hole finished to a diameter of .469 for a depth of $\frac{3}{16}$ ". Balance of $\frac{3}{16}$ " hole is finished to $.450"$ and counterbored and $\frac{1}{4}$ " hole is reamed to a .262 diameter for a depth of $\frac{1}{4}$ ". 6th Position: Piece is cut off.

GREENLEE

Automatic
SCREW MACHINE



Why THE TOOL ENGINEER is a Member

Because membership in the National Business Papers Association means the raising of standards of business paper publishing—and *we believe in that.*



Because membership in the National Business Papers Association means that each publication member must pledge himself to periodic audits of his circulation and certified copies must be available at all times, and *we believe in that.*



Because membership in the National Business Papers Association means upholding the policy of "Truth in Advertising," and *we believe in that.*



Because membership in the National Business Papers Association means that we believe that advertising in business papers when properly directed is the most effective and profitable method of cultivating a market—and as a member we pledge ourselves to cover the maximum purchasing power within our selected field.



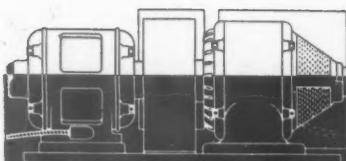
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Thor

HIGH FREQUENCY ELECTRIC TOOLS

Operating on 180 cycle, 3-phase, 220 volt current, induction motored High Frequency tools maintain a virtually constant speed under load, as opposed to the considerable drop in load speed in universal motored electric tools. Thus, High Frequency tools deliver their full rated power and productive capacity at all times.



Plants with 10 or more universal electric tools can profitably investigate THOR High Frequency Tools as time and money savers.

Recent Findings Show How to increase Your Production.. And Cut Cost, Too!

The Tool Engineer of this plant not only got 43% More Production, he ALSO cut maintenance by installing Thor High Frequency Electric Tools

• **WITH A SUB-CONTRACT** for the manufacture of connecting rods added to normal production requirements, this medium-sized plant was steadily dropping behind schedule on assembly operations. Their portable power tools slowed down under load, wasting valuable seconds; the tools "wilted" in continuous operation and time out for repairs caused additional costly delays.

Installation of a battery of Thor High Frequency Nut Setters, with their simplified design and sturdy construction, has almost entirely eliminated tool failures. And the High Frequency Tools' characteristics of *constant speed under load and greater power per pound of weight* permit operators to do more work in less time with much less fatigue. Production has increased 43% in one month!

Similar results can be obtained by any plant operating 10 or more portable power tools. High Frequency will increase production up to 30% if you are now using air tools; much more than 30% if you are using universal electric tools. Maintenance will be substantially lower too, because High Frequency design eliminates commutators, brushes, pistons and other parts that cause repair expense in universal electric and air tools.

If today's production requirements demand that your plant do more work... faster, then find out now what Thor High Frequency Tools can do for you. Send for the booklet offered below.

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Less Fluid Slip—More Power with Hannifin Precision Cylinders



Hannifin Hydraulic Cylinders, built to match modern machine tool construction, provide the precision construction with honed cylinder bores that means high efficiency operation—minimum fluid slip and maximum usable power. All Hannifin cylinders are shop tested for fluid slip at 1000 lbs. per sq. in. pressure. The patented no-tie-rod design gives a stronger cylinder assembly, simpler to use, assuring all the advantages of high efficiency hydraulic power, easily adapted to many different types of use.

NO TIE RODS. This simple, strong design eliminates a source of leakage and allows removal of end caps without collapse of other parts.

UNIVERSAL CAPS. End caps may be positioned independently, with inlet port at top, bottom, or either side.

AIR VENTS. End caps have air vents on three sides so that there is always a vent at the top when inlet port is at either side or bottom.

HONED BORE. Special mirror finish honing (in even largest sizes) produces a straight, round, perfectly smooth cylinder bore. High efficiency piston seal means maximum power, minimum fluid slip.

ALL TYPES AND SIZES. Built in seven standard mountings, with small diameter piston rod, 2 to 1 differential piston rod, or double end piston rod, with or without cushion. All sizes, any length of stroke, for working pressures up to 1000 and 1500 lbs. per sq. in. Special types built to order. Write for Bulletin 35 with complete specifications.

HANNIFIN MANUFACTURING COMPANY
621-631 SOUTH KOLMAR AVENUE, CHICAGO, ILLINOIS

Detroit representative: R. A. Bean, Hayward Building, 4829 Woodward Avenue, Telephone Columbia 4949

HANNIFIN HYDRAULIC CYLINDERS

THE TOOL ENGINEER

THE TOOL ENGINEER

TRADE MARK REGISTERED
IN U. S. PAT. OFF.

MAY, 1941

Volume X, No. 5

Am I an American?

FOR the third successive year, the people of the United States will celebrate "I Am An American Day" on May 18.

It is needless to stress the importance of citizenship in the United States in times like these. Most of us realize, as Americans have seldom realized before, the full implications of our *rights* as citizens in a democracy. It takes little more than a cursory glance at a newspaper to tell us that.

But are we so keenly alert to the full implications of our *responsibilities* in a democracy? If we are to share in its advantages we must of necessity contribute our share to the maintenance of that democracy if it is endangered.

As yet we are not doing this.

The drafted soldier is in many cases giving up a lucrative position to take a dollar a day. Numerous budding careers have to be sidetracked and many men will find it impossible to resume these careers at the point of interruption. It is true that these men are being developed physically and their health is doubtless being improved. In a world where brawn occupies a decreasing place of importance, some may find this scant consolation.

What responsibilities and sacrifices are the rest of us accepting? There are many engineers and government career men who are sacrificing their evenings to work to the limit on the Defense Program.

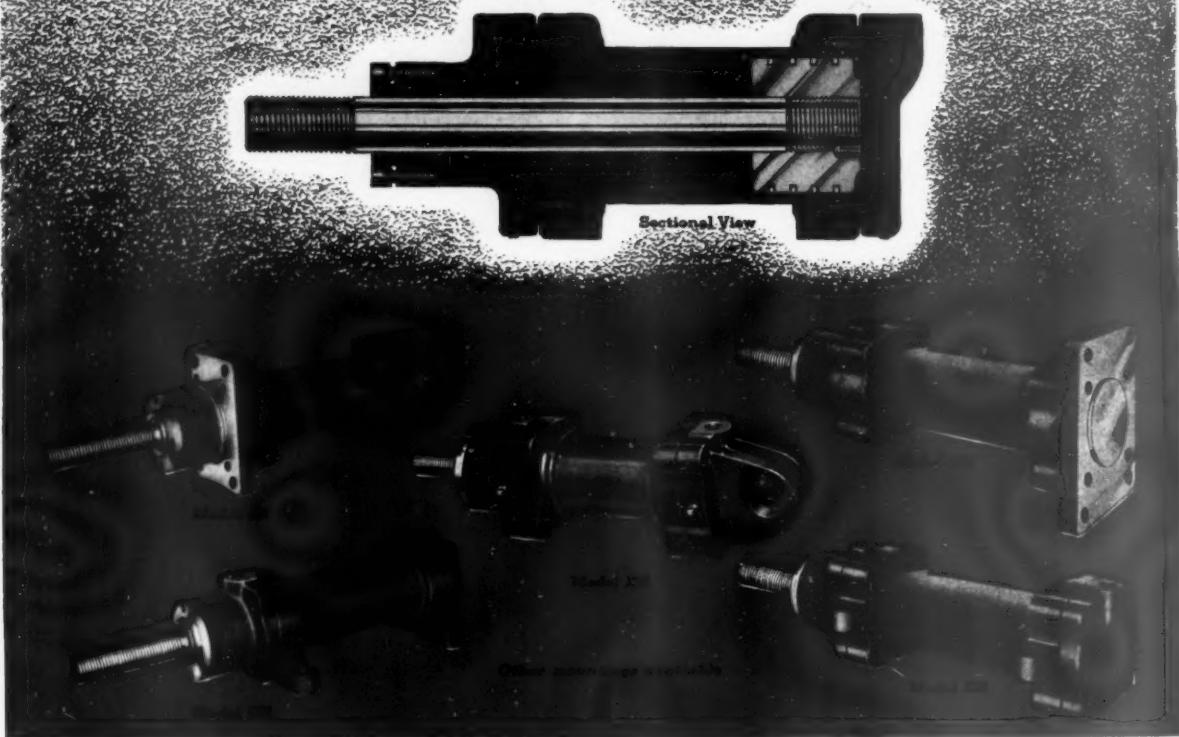
Primarily, despite these exceptions, we are still concerned with ourselves and not with our nation.

May 18 is a good chance for each one of us to pause and take stock of his own personal relation to his government.

Am I a worker? Have I caused a delay in Defense Production through strikes in vital industries? Am I an executive? Have I been unreasonable and refused to share increased profits or have I worried too much about peacetime markets? Am I an engineer? Have I complained at the long hours or the difficulties under which I have had to work? Am I a politician? Have I sought to gain personal advancement by placing the Defense tag on irrelevant bills or have I introduced additional red tape to delay Defense Production?

If we cannot conscientiously answer these and other questions to our own satisfaction then we had better do a little serious thinking. We had better ask ourselves how much our democracy, our freedom, means to us personally. We had better try to picture our life without it, and then, taking stock, make such alterations as necessary in our viewpoints and our actions so that we can commemorate "I Am An American Day"—and every day—with a clear conscience and a firm belief in the rights and responsibilities of those living in a democracy.

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**G.T.D. TAPS
SET FINE
RECORD**

THE job is tapping a deep hole in a brass body — thread size $\frac{1}{4}$ "-24. "GREENFIELD" High Speed Ground Thread Taps, especially designed for brass, were selected for the job and completely satisfy the manufacturer. The re-

result proves the importance of calling in experienced threading engineers in order to obtain tools that will give lowest cost per tapped hole.



Today it is hard to get small tools as fast and in as great quantity as most manufacturers wish them. So it's more important than ever to get the greatest possible production from every single tool. It's a pretty good time to draw on "GREENFIELD'S" huge fund of experience.

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GREENFIELD, MASSACHUSETTS

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TAPS - DIES - GAGES - TWIST DRILLS - REAMERS - SCREW PLATES - PIPE TOOLS

THE TOOL ENGINEER

Requirements for Tool Engineering

By **DON FLATER**
Works Manager
Chrysler Division

ONE clause of the A.S.T.E. qualifying provision for membership in the society states that a man must be of recognized ability to plan the order of operations, to lay out and supervise the design and manufacture of tools and equipment.

At the present day you can look anywhere around you and see the creative genius of the Tool Engineer together with his skillful planning and evidence of the above qualifications. The solution of vexing problems of manufacturing are referred to the present Tool Engineer, or perhaps to the higher executive who at one time has served in that capacity, resulting in this type of work rapidly becoming a recognized science.

On the street, in the home, in the factory, or wherever you go you will observe some object or device that has required the skill of Tool Engineering to produce, such as the tooling of the automobile, the aeroplane and its many improvements, and the radio. Physicians and surgeons now utilize much mechanical equipment which must be produced economically through proper manufacturing methods. The recognition of the practicability of plastics required much study to arrive at the type of dies to form various fashions and styles through the different methods of molding. Chemistry has become very active in the last few years, producing over one-hundred thousand new formulas and chemicals, many of which are used in the formation of unit parts, requiring the skill of an engineer as to the method of producing them.

The improvements in photographic equipment, the design and building of movie cameras, aerial equipment for topography films taken from the air, necessitated careful planning of the right equipment to produce the assemblies accurately and economically, together with the many types of projectors. Automatic printing machines costing as high as fifty-thousand dol-

lars and with the volume of one-thousand pictures printed from the negative per hour, required careful tooling, together with the various types of range finders, light meters, and automatic photo-flash equipment. In 1939 sixty-million dollars was spent in the United States for photographic equipment all of which had to be tooled and engineered.

In 1940 one-seventh of the total currency in circulation was spent for fishing tackle and equipment; much of this equipment required intricate tool setup.

The continuous improvements in farm implements, such as the tractor, with its power take-off, and general purpose facilities, constantly require new methods. The cotton picker, now coming into prominence will demand much engineering work, together with combine threshers, combination potato diggers and sorters, and automatic loading into wagons and trucks. The extensive electrifying of rural homes throughout the United States requires additional electrical appliances and many new appliances not yet announced are coming forth that will be of great value to the farm home.

The candling of eggs by electrical equipment, automatic potato and apple peelers used in canning plants, all have to be tooled.

The recent research in the development of finer finishes has demanded many additional types of machines, jigs, and fixtures to provide these finishes on the working parts of automobiles, tractors, and aeroplanes, necessitating an enormous amount of production engineering. At the present date

Through the skill of hands and mind the Tool Engineer is becoming more and more predominate in production.

this research is only in its infancy and will grow more extensive in the future.

Recently a nation has demonstrated what proper mechanical equipment and design will accomplish in modern warfare on land and sea. The war, becoming that of a mechanical nature, the various types of shells, torpedoes, and range finding equipment, had to be tooled and produced through the efforts of Tool Engineers. Warring nations become victorious by superior mechanical means. The United States has become the greatest industrial nation on earth due to superior mechanical means. By 'superior' is meant, superior in design, superior in quality and quantity in its production, and economy in its manufacture. Our own nation is now in the midst of the greatest defense program of all times. It is a program almost entirely of a mechanical nature. Its completion will probably depend more upon the use of the Tool Engineer than has any other demand, with the possible exception of the automobile.

Through the skill of hands and mind the Tool Engineer has been predominate in the production of the above mentioned facilities and will continue to become more and more important, requiring even greater skill in his profession than he now possesses. The above developments will not alter the results of the analysis and ingenuity of Product engineering only, but must be closely associated with that of the Tool Engineer, who has and will contribute much toward improved design.

The Engineer must be responsible for producing these units for assembly, not with the main object in mind being as to how closely fixed demands can be approached, but for the purpose of economy and how well the unit will function under the job for which it is intended.

Look all about you; you have had a great responsibility in the past and have a great one ahead of you.

Longer Tool Life

National Defense demands make it more important than ever to use tools which are most efficient, most economical, and will give longest life.

FUNDAMENTALLY what we demand of a tool is that it should give us the desired production per hour at the minimum of tool cost and with the fewest interruptions for tool changes. This means that a tool must first be of proper design. It must, secondly, be a tool of reasonable long life. It should produce work to a high degree of accuracy over a long period of time without sharpening; not only for maintaining quality but also to re-

By C. A. HOOPER

Tool Supervisor

Chevrolet-Flint Division, General Motors

duce "down" time of equipment for tool changes and re-setting.

At Chevrolet-Flint we stress the importance of a longer tool life. We have tool trouble men and tool technicians constantly searching for better tools, for tools with longer life. It

is not unusual for us to be conducting tests on as many as 25 to 30 different tools at the same time. The answer may be found in the design, the analysis of the material from which the tool is made, the heat treatment, surface treatment, or there may be some mechanical change required in some part of the machine itself. The failure of a tool is not always the fault of the tool itself. Our first problem in tooling a new job is to design a

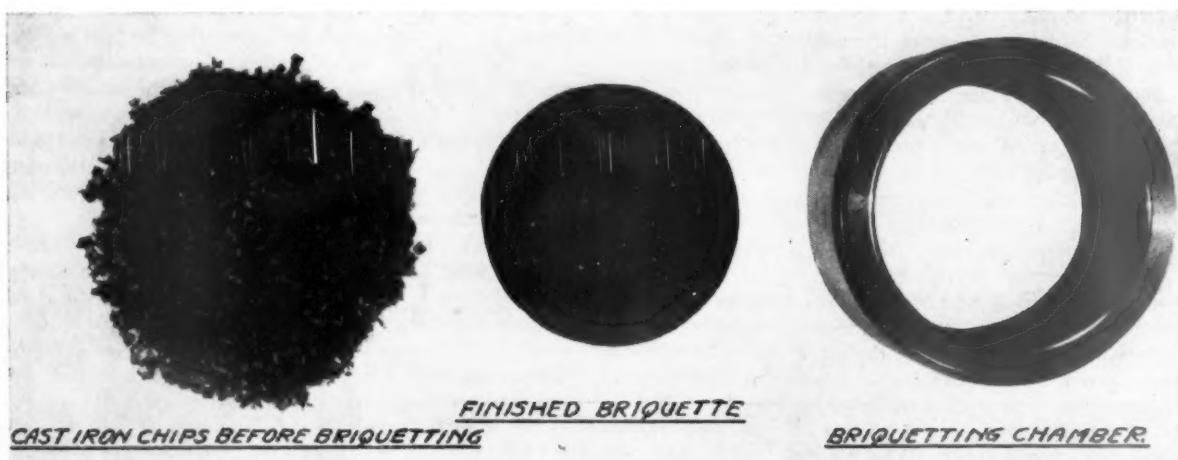
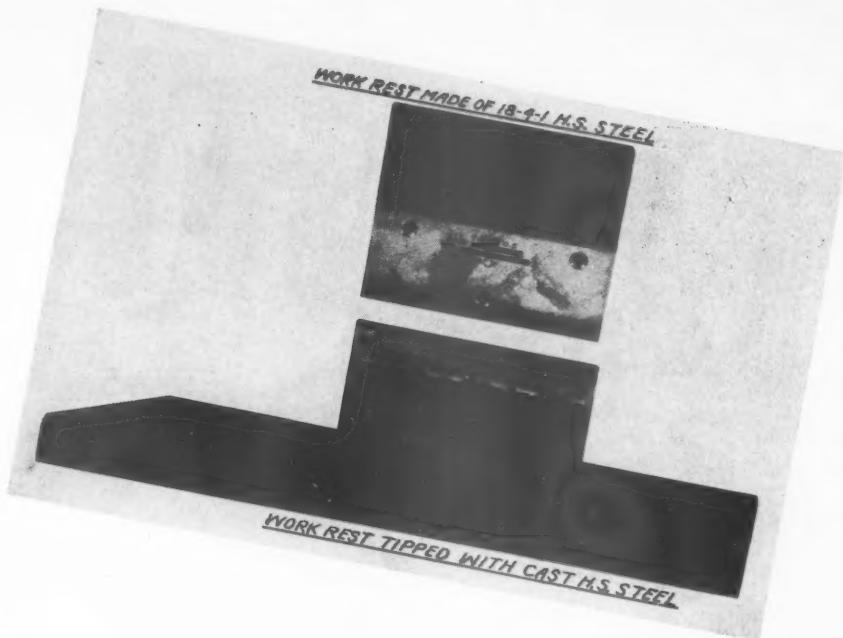


Figure 1
Cast high speed steel briquetting chamber.

Figure 2
Centerless grinder work rests;
hardened and drawn type at
top; cast high speed steel
tipped at bottom.



tool which we think will do the job satisfactorily. As soon as production "hits its stride" on that part, and frequently before, we start experimenting with various steels, heat treatments, speeds and feeds trying to improve the tool performance; trying to get more pieces per grind and more grinds per tool. In varying degrees we are successful.

We have found that the contour to which tools are ground has a greater influence on tool life than is generally appreciated.

Involved are such factors as:

1. Avoiding sharp corners on tools which might chip, break off, or burn.
2. Distribution of load over the tool so as to distribute wear.
3. Grinding tools so as to assure minimum wear on the part of the tool responsible for the sizing and surfacing.

Cast High Speed Steel

While cast high speed steel is not a new material, it has only recently become a commercially practical material. We are using cast high speed steel on several operations requiring a wear or abrasion resisting material.

Briquetting Chambers

Figure 1 shows a cast highspeed steel briquetting chamber. It is in this chamber that all cast iron turnings from the Motor Division are

compressed. The purpose being to enable us to form the cast iron cuttings into briquettes, and in this form to return the cuttings to the foundry as cast iron bricks rather than in the loose form.

The briquettes are $4\frac{1}{2}$ " in dia. and $3\frac{1}{4}$ " long. They weigh 10 pounds each, and are compressed at the rate of 900 briquettes per hour.

When this operation was first started, the chambers were made of 18-4-1 highspeed steel. The life of this highspeed chamber averaged 51,500 briquettes before they were worn out and a total of 208 chambers per production year were required.

Chambers made of what we will call alloy No. 1 averaged 155,000 for the life of the chamber. 69 of these chambers were required per year.

We are now using chambers made of cast highspeed steel from which we get an average of 268,000 briquettes per chamber. The hardness of this cast material is Rockwell "C" 67-68. We use 40 of these chambers per year and effect a savings of \$8,750 a year by using the cast highspeed steel in place of the 18-4-1 steel.

Grinder Work Rests

Centerless grinder work rests used for grinding valve stems, were formerly made of 18-4-1 type highspeed steel. These rests were of the type shown in the top of the picture. The entire rest was hardened and drawn

and then the area with the holes in it was drawn sufficiently to prevent breakage when it was riveted to the supporting bar. An average life of 20,000 valves per rest was obtained.

A work rest tipped with cast highspeed steel as shown in the bottom of *Figure 2* is the latest development. The main body of the work rest is made of cold rolled steel and a strip approximately $5/16$ " high is built up on the top edge with cast highspeed steel welding rod. Work rests of this type average 450,000 valves each. When the cast high speed steel wears off, it is built up again, reground, and put back in service. This rest gives much better service than the other type because it is all one piece, it is much more rigid, and there is no danger of breakage in riveting.

A saving of \$1,258 per production year is realized by using the work rest tipped with cast highspeed steel.

Hob

We are also using cast highspeed steel for one of our hobbing operations. This hob is used to cut a 6" O.D. 10 pitch gear with a right hand Helix and 54 teeth. It is the Chevrolet Camshaft Timing Gear.

The gear is made of a bakelite and fabric composition. A cutting speed of 220 r.p.m. or 343 surface feet per minute with a feed of .0002 per tooth per revolution is used. No coolant or lubricant is used.

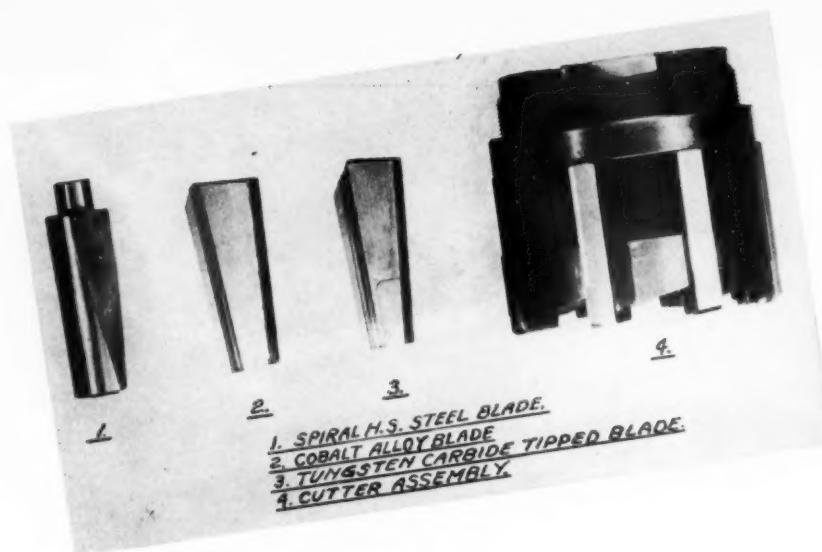


Figure 3
Types of inserted blade reamers for rough boring of cylinders.

Where we previously used a hob made of 18-4-1 steel we received 20,000 gears for the life of the hob. Using cast highspeed steel hobs and operating under identical conditions we are averaging 40,000 gears per hob life. The material being cut with this hob is highly abrasive and we are pleased to find a hob that will do this job so efficiently.

To sharpen this hob we find it is necessary to remove only .005 whereas with the 18-4-1 hob it was necessary to remove .011 per grind.

There is also a notable reduction in "down time" caused by changing the hob for sharpening.

Molybdenum Steel

You are probably familiar with results obtained from cutting tools made of Molybdenum Steel. Our experience has been that many tools can be made from molybdenum steel with as much success as tools made from steel of a higher tungsten content. We have had an interesting experience with molybdenum hot die steel in connection with our valve extruding operation. This job concerns the forging or extruding of valves from a slug of steel heated to 1900-2000 F. We have effected a considerable saving by using the molybdenum steel for this hot die operation. I will mention the performance obtained from three details used in connection with this job.

By using molybdenum hot die steel we had a 148% increase in the life of a detail which we call the ring; we had an 82% increase in the life of a detail which we call an insert; we had

a 75% increase in the life of a detail which we call a punch. By using the molybdenum hot die steel instead of the highspeed steel we made a savings of \$7,381 on the ring detail; \$1,841 on the insert detail; and \$3,053 on the punch detail. This gives a total savings of \$12,275 per production year on valve extruding details by using the molybdenum hot die steel. These figures are based on the operating life of the details only. There is also a savings of \$11,829 per production year on tool room manufacturing costs and a total savings realized through the use of this molybdenum hot die steel, as compared with the higher tungsten steel, of \$24,105 per production year. These figures do not include the additional savings which might be gained because of less "down" time on the job for changing dies.

Molybdenum Lathe Tools

Molybdenum Lathe Tools have been adopted for use on crankshaft turning operations in preference to the older 18-4-1 type steels that were formerly used. Molybdenum was adopted because of its lower price and equal performance. Life obtained from tools made of the two steels is almost identical. As an illustration, one test was run, involving 64 tools and 10,090 crankshafts. 32 of the tools were made of molybdenum steel and 32 of the tools were made of 18-4-1 tungsten highspeed steel. Each group of 32 tools was composed of the same number of identical details. The molybdenum group averaged 59.7

crankshafts per grind, and the 18-4-1 group averaged 59.0 crankshafts per grind. Both groups of tools gave the same number of sharpenings. Other tests have showed substantially the same results.

Using molybdenum highspeed steel tools will result in a saving for us of \$1,650 per production year on crankshaft turning.

Rough Boring Cylinders

This operation is performed on a battery of twelve 6-spindle cylinder boring machines. Production is 31 cases per hour per machine and each operator runs two machines.

The spindle head consists of two banks of three spindles each. One bank rotates clockwise and the other bank rotates counter clockwise to help suppress any tendency to chatter which may develop. The spindles rotate at 85 r.p.m. and are hydraulically fed at a rate of $7\frac{1}{2}$ inches per minute. This gives a cutting speed of 76 surface feet per minute and a feed of .088" per revolution. The cylinder bore is approximately $7\frac{1}{2}$ inches long and $3\frac{3}{16}$ inches in diameter.

The cylinder is rough bored to $3.4295"$ which makes approximately .240 to be removed from the diameter by the roughing operation. This is a dry operation, no coolant being used. The hardness of the cylinder bore varies from 85 to 95 Rockwell "B" scale.

A few years ago (Figure 3) this boring operation was done with an inserted blade reamer, using 6 spiral

18-4-1 high speed steel reamer blades. With this reamer and the 18-4-1 blades we obtained an average of 924 bores per sharpening and a total blade life of 12,000 bores. The cost of these blades and the sharpening of them for a production year amounted to \$9,180.

With no change in feed or speed, and using an 8 bladed reamer with Cobalt Alloy blades we obtained 2,166 bores per sharpening and a total blade life of 46,772 bores.

By using this metal the total cost for blades and sharpening was reduced to \$1,650; a saving of \$7,530 for the year.

Still using the same feed, speed and reamer body but with tungsten carbide tipped blades we obtained 16,305 bores per sharpening. The total blade life was raised to 391,320 bores which reduced the blade and sharpening cost to \$1,090 per production year. Based on present day prices of tungsten carbide, the savings would be further increased.

One of these reamers using the tungsten carbide tipped tools would bore a hole in iron 45.9 miles deep and would remove 80,285 pounds of metal.

Milling Distributor Boss

This operation consists of milling the top side of the distributor boss on the cylinder and case. A cut approximately 1/16 of an inch deep is taken off the top side of a boss 1 1/2 inches in diameter and on a 1/2" wide rectangular strip located in back of the round boss. The total length of the cut is six inches. The cutter on the left is a regular 10 tooth, 2 1/4 x 1 1/2 x 3/4 shell end mill. An operating speed of 114 r.p.m. (67 surface feet per minute) with a feed of 17 inches

per minute is used. This gives a chip load of .015 of an inch per tooth.

From the worn out highspeed steel cutter shown in the center of *Figure 4* we received 17 sharpenings and milled 28,120 cases. The tungsten carbide tipped cutter on the right side of the picture milled 30,475 cases on the first grind, and is still in excellent condition. It is of interest to note that the tungsten carbide tipped cutter has been running for 17 weeks without being removed from the machine; while the highspeed steel cutter only lasted for a total of 16 weeks and was taken off and put on 17 times. Barring unforeseen complications and accidents, the tungsten carbide tipped cutter will probably run for at least 10 sharpenings for a total of 304,750 cases or 170 weeks.

There is not a great deal of difference in the price of the two tools over a period of one year; the saving is in less sharpening and reduced production down time.

Tapping Flywheel

It is required that six holes, with 80% threads, be tapped through the 3/4" thick crankshaft flange. Forged G.M.C. 1045A steel hardened and drawn to No. 228-286 Brinell hardness is used for crankshaft material. The tapping is done on machines that perform several other operations, including drilling, reaming, and chamfering. All six holes are tapped at the same time at the last station on the machine. The taps are driven at 140 r.p.m. or 14 surface feet per minute. 3% soluble oil in water is used for coolant. 82 crankshafts per hour are processed on each machine.

A three flute, number one tolerance,

precision ground, highspeed steel tap was first tried. An average life of only 190 holes per tap was obtained. Other highspeed steel taps tested were the following:

- 3 Flute, interrupted thread, number one tolerance, precision ground.
- 4 flute, commercial ground.
- 3 flute, commercial ground.
- 3 flute, number two tolerance, precision ground.
- 4 flute, number two tolerance, precision ground.
- 3 flute, interrupted thread, commercial ground, gun point.
- 3 flute, right hand spiral, interrupted thread, commercial ground.
- 3 flute, left hand spiral, interrupted thread, commercial ground

Numerous tests have showed that the 3 flute, right hand spiral, interrupted thread, commercial ground tap was the best tap available for this particular job. Under normal conditions, an average life of 750 holes per tap is obtained in two sharpenings, or an average per sharpening of 375 holes. These taps are highspeed cased and have a two thread chamfer.

With the increased tap life obtained (750 hole average against 190) there would result a saving of \$29,236 per production year, comparing the original tap performance with the tap finally selected.

Dial Indicator

Formerly a two inch dial indicator graduated in one half thousandths of an inch, was used to measure the size of the crankpins and bearings as they were being ground. This indicator was too small and the operators had



Figure 4
Types of milling cutters for milling top side of distributor boss on cylinder.

difficulty maintaining the desired bearing sizes. The $3\frac{1}{2}$ inch dial indicator (Figure 5), developed at the request of Chevrolet-Flint, has eliminated most of the fault found with the old two inch indicator. One of the features of the $3\frac{1}{2}$ " indicator is the ease with which it can be read by the operator, because the scale is spread out much more than it was on the two inch indicator. Also, the $3\frac{1}{2}$ inch indicator is graduated in ten thousandths of an inch, as against the one half thousandths of an inch in which the 2 inch indicator was graduated. This feature enables the operator to

grind the bearings (Figure 6) to exact size with less effort; also the $3\frac{1}{2}$ inch indicator is more ruggedly constructed with the result that fewer repairs are required; the first indicator tested remaining on the job in constant use for a full production year with no repairs.

Core Drilling

The Chevrolet Connecting Rod is made of forged G.M.C. No. 1035A steel, hardened and drawn to obtain a hardness of No. 207-255 Brinell hardness.

Twelve spindle continuous auto-

matic drilling machines are used to rough drill the crankpin hole in the connecting Rod. The rough drilled hole is $2\frac{5}{16}$ inches in diameter and approximately $5/16$ of an inch of stock is removed from the diameter at the point of maximum draft in the rod.

Previously this operation was done with a solid four flute core drill, (Figure 7) made of 18-4-1 type high-speed steel. An average life of 2,920 holes per drill was obtained in 9 sharpenings for an average per sharpening of 325 holes. Later an inserted blade core drill of the type shown in the picture was developed. Four blades made of 18-4-1 type highspeed steel are used in each body. An average life of 7,150 holes per set of four blades was obtained in 11 sharpenings, for an average life of 650 holes per sharpening.

By using the inserted blade type core drill, a saving of \$10,298 per production year was made.

Salvage

It is surprising the saving that can be effected by carefully watching the salvage department. I will give one illustration of a saving we have made.

We use a $\frac{3}{4} \times 1 \times 6$ highspeed steel tool for turning or checking the sides of the crankshaft counterweights and arms. Previously only $2\frac{1}{8}$ inches of the 6 inch length of tool was used; $3\frac{1}{8}$ inches being scrapped because it

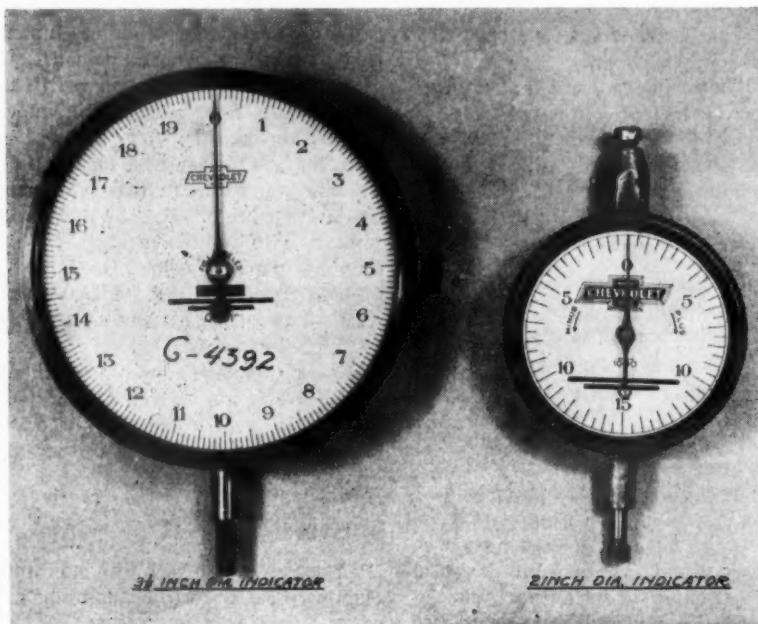


Figure 5 (above)
Types of dial indicators used
to measure size of crankpins
and bearings.



Figure 6 (right)
Installation of the $3\frac{1}{2}$ " dial
indicator on grinding machine.

was too short to be held in the tool holder. At the present time, we take a piece of 1112 steel, approximately $3\frac{1}{8}$ inches long and braze it onto the end of the $3\frac{1}{8}$ inch unused portion of the cheeking tool. This makes it possible to use an additional $2\frac{1}{8}$ inches of the original 6 inches (Figure 8) and gives us an increase in the original tool life of 82 per cent.

Before salvaging this unused portion of the tool we had a total tool life of 725 cranks, whereas after salvaging the tool the total tool life is 1,325 cranks.

The salvaging of this piece of scrap steel results in a savings of \$2,484 per production year.

Milling Locating Point

The reason for including this interesting tool is to show primarily a tool designed for easy set-up and the elimination of "down" time, rather than increased tool life.

These side milling cutters are used to mill the locating points on the crankshaft. Two cutters are mounted on each spindle head. The cutters move in a horizontal plane, towards and away from the work, independently of each other. However, they cannot be moved in a vertical plane independently of each other, they must be moved together. It is required that both points milled by cutters on the same head be the same height. Therefore, it is necessary that the two cutters used on the same head be the same diameter.

When the dull side milling cutters on this job are changed, it is necessary to either replace the dull cutters with cutters of the same diameter or adjust the height of the head. It is a rather complicated job to adjust the head for height, it necessitates the loosening and tightening of ten bolts and making a trial cut. If the initial adjustment is not correct it is necessary to repeat the procedure. Each adjustment and trial cut requires at least ten minutes.

Originally regular side milling cutters were used. In so far as it was possible to utilize only one side of each cutter on this job, it was decided to use regular right hand cut half side milling cutters. Later this reversible or double half side milling cutter (Figure 9) was developed. This cutter is not unlike two right hand cut half side milling cutters welded together. When one side of the cutter

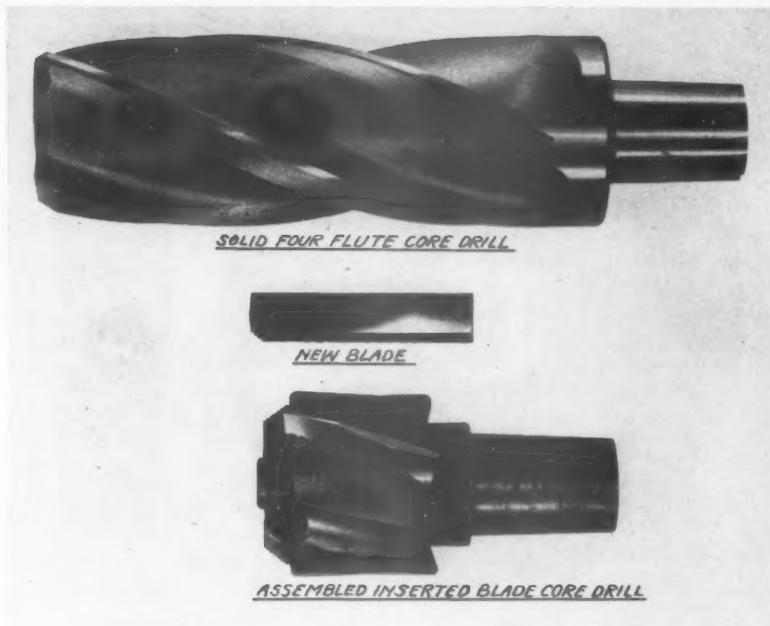


Figure 7
Types of core drills for rough drilling crankpin hole in connecting rod.

as shown becomes dull it is only necessary to take the cutter off, turn it over and put it back on, no adjustment of the cutter for height is required at this time, and very little time is lost changing cutters.

The reasons for developing the reversible side milling cutter were:

1. Less time was lost changing cutters as was previously mentioned.
2. Fewer cutters have to be handled and carried in stock.

3. Cutters last twice as long as regular half side milling cutters, but do not cost twice as much.

Using the reversible cutters, it is necessary to change cutters only once every sixteen hours. New cutters are put on by the first shift in the morning and the second shift merely turn the cutters over and continue.

The 7" cutters have 44 teeth and are run at 40 r.p.m. or 91 surface feet per minute. The 6" cutters have 40

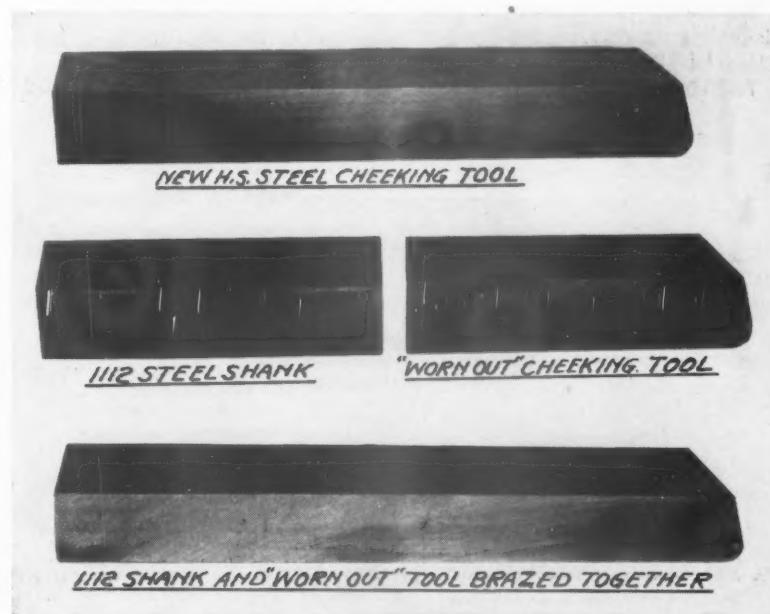


Figure 8
Salvage of part of checking tool adds 82% to tool life.

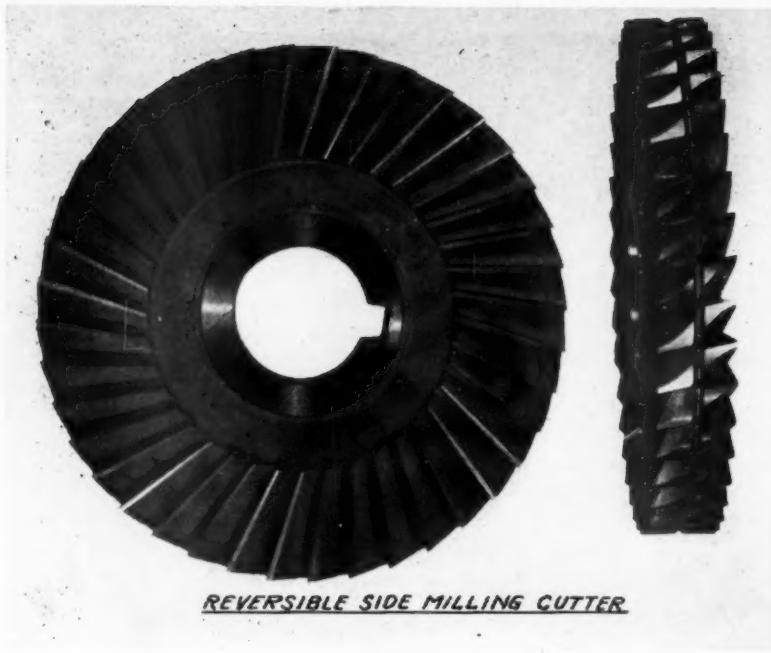


Figure 9
Double half side cutter causes large savings.

teeth and are run at 58 r.p.m. or 91 surface feet per minute. The 5" cutters have 34 teeth and are run at 58 r.p.m. or 76 surface feet per minute. Feed is approximately 6.25" per minute.

Approximately 50 cranks per hour are milled on each machine, and 3% soluble oil in water is used for coolant.

Four Diameter Twist Drill

We are all very proud of a four diameter twist drill we developed at Chevrolet-Flint.

The clutch pilot bearing hole is

drilled in the flywheel end of the crankshaft on the axis of the main bearings. The purpose of the hole is to hold the bearing that supports the front end of the transmission drive shaft.

Some years ago a three diameter pilot hole was used. At that time, the hole was drilled in three operations, using three drills. Batteries of three single spindle drill presses were used. The crankshaft being moved from one spindle to the next as work on the hole progressed.

Next a two diameter pilot hole

was used and it was drilled with a two diameter or Sub-land drill as shown. Single spindle drill presses were first used. Later 12 spindle drilling machines replaced the single spindle drill presses.

A later development was a three diameter pilot hole drilled with a three diameter drill as shown.

The latest development, and the tool we now use, is a four diameter drill (*Figure 10*) drilling the following approximate dimensions:

The smallest portion of the hole is $\frac{7}{8}$ " in diameter and $\frac{3}{8}$ " long (or deep.)

The second step is $1\frac{3}{64}$ " in diameter and $29\frac{31}{32}$ " long.

The third step is $1\frac{19}{32}$ " in diameter and $9\frac{31}{32}$ " deep.

The fourth step is $1\frac{11}{16}$ " in diameter and $5\frac{3}{32}$ " long. There is a 45° chamfer between this largest diameter and the next smaller diameter. The ends of the second and third diameters are flat. The end of the first diameter is formed by the 118° drill point.

If the four diameter drill had not been developed, it would have been necessary to purchase approximately \$42,000 worth of new machine tools to perform the additional drilling operation.

The interesting thing about our job is the constantly changing demand for tools for constantly changing operations. The book we are reading is most interesting, but we will never finish the story—there will always be another page.

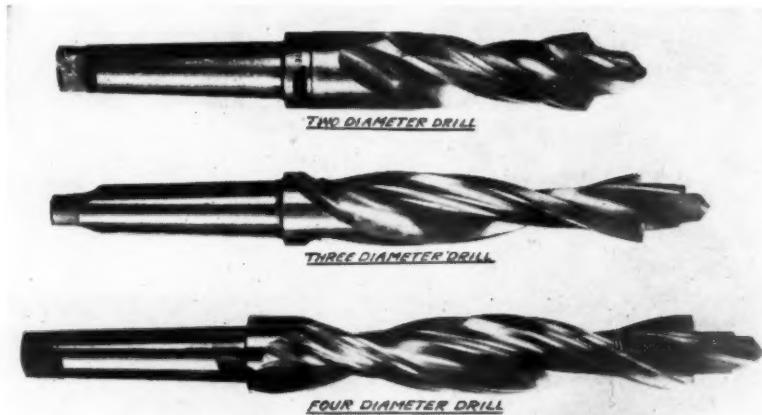


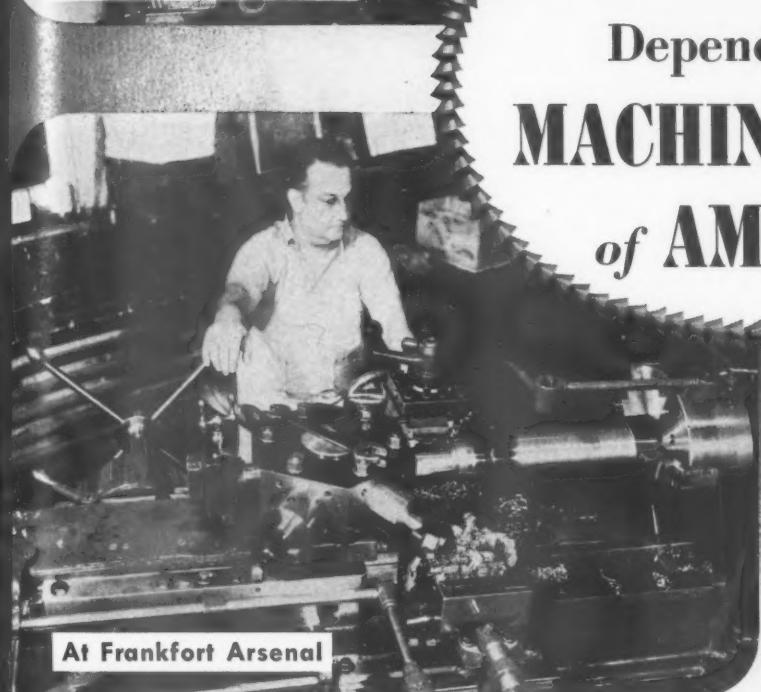
Figure 10
Steps in the development of the four diameter twist drill used for clutch pilot bearing hole in flywheel end of bearing shaft.



At Brooklyn Navy Yard



At Watervliet Arsenal



At Frankfort Arsenal

The Defense Program Depends on the **MACHINE SHOPS** *of AMERICA*



At Springfield Armory

• Modern warfare is a contest of men and machines; but a war of men and machines means more than a battle of "flying machines," machine guns, tanks and armored cars. It means a battle of shop men armed with machine tools—a feverish race to produce the largest volume of war materials ever known.

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Cutting Oils

Proper selection and use of cutting oils is necessary to economical production—an interesting discussion of the principles involved.

By O. L. KING
O. L. King Company
San Francisco, California

CUTTING oils are lubricants usually of a superior type and in fact, to serve satisfactorily for machining certain types of metal they must be lubricants of outstanding ability. To discuss the subject of cutting oils necessitates the discussion of lubricants, lubrication and all of the properties, adhesion, cohesion, film strength, dispersion, surface tension, polarity, capillarity, creep, fluidity, stability and rust preventing properties.

Many of these terms are related, as for instance surface tension, polarity, capillarity, creep and dispersion constitute the wetting properties, while adhesion and cohesion are related to film strength. Almost everyone is familiar with these terms and understands their meaning without realizing their importance. An example is rain drops on the automobile windshield remaining as separate drops because of surface tension and interfering with vision until they are swept together into a continuous film by the wiper. If the rain falling on the windshield were dispersed into minute particles of low surface tension, sufficient creep and capillarity, no wiper would be needed and the glass would be completely wetted.

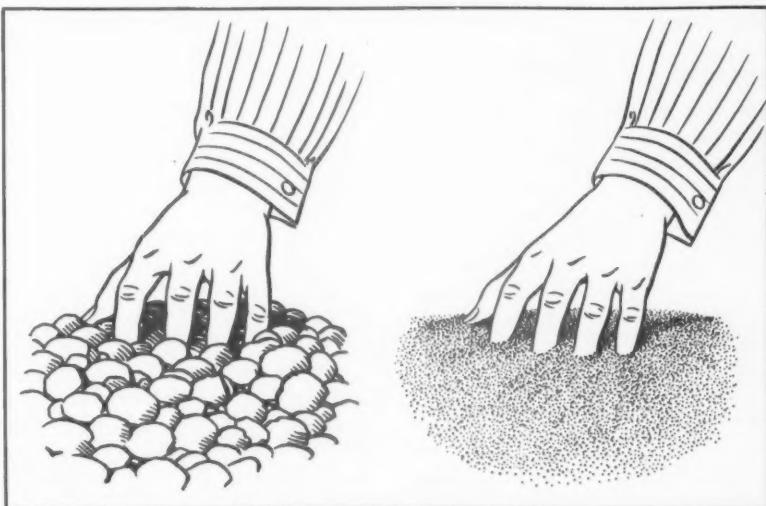
Cutting oils are often called coolants and in a sense they are, for the reason that by properly lubricating the sliding of the chip over the tool and by carrying away the heat generated by the shearing of the metal they

actually function as a coolant. However, a very high grade cutting oil if used in too viscous a state can retain considerable heat and cause very hot working conditions, although at the same time properly protecting the cutting tool. Good cooling and lubricating properties are both necessary in a good cutting oil.

If it were not for one of the very necessary properties of a good lubricant, that of creep, or wetting action, or capillarity, very little oil would get to the most important point during the cutting of metal. Even though the

flow of the cutting oil is supplied by considerable force as with a pump, if the wetting action that is sometimes defined as low surface tension does not permit the oil to creep into the area of action to extract the heat generated by the rupture of the metal and to find its way between the surfaces of the chip and the tool, to eliminate friction, an early failure of the tool will result.

In a rotating bearing the lubricating oil is constantly pulled into the area of greatest pressure by hydrodynamic force. This force is a result



Cutting Oils Should be Finely Divided
Compare efforts to move the fingers through stones and through sand.

of the tendency of the oil to adhere to the metal and to cohere to itself. The speed of rotation wedges the oil under the rotating shaft and actually lifts the shaft to prevent metal to metal contact. With metal cutting operation the hydro-dynamic force is practically non-existent because the metal that is being severed by the cutting tool is constantly disrupting the path of the hydro-dynamic force or action.

Fluid Film

In lubrication a satisfactory lubricant functions in what is known as a fluid film. This means that besides the film of oil attached to the stationary bearing surface, there are additional films between these two attached films that allow for the easy practically frictionless rotation. Friction in fluid film lubrication is often increased considerably by the sluggish lubricant and heat is generated thusly, but ordinarily the fluid film type of lubrication maintains temperatures that are satisfactory for long bearing life.

However, upon stopping a rotating bearing there comes a moment when the fluid film disappears from between the moving parts and what is known as boundary film lubrication results. That is the point at which only the two attached films remain to perform any lubrication. As one film is moving and the other film usually standing still the friction is considerable at this moment, and evidence of this fact can usually be seen by the tendency of the metal in the bearing to flow or wipe slightly in the direction of rotation.

Dispersion

Boundary film lubrication also exists in bearings when the lubricant fails and just before bearing seizure takes place. Upon starting machinery in rapid motion boundary film lubrication is very soon eliminated by hydro-dynamic force building the fluid film. Cutting oils must function practically always as a boundary film lubricant for reasons before stated, and for the additional reason that the cutting tool could not be brought close enough to the moving surface to make a smooth finish if the cutting oil functioned as a fluid film lubricant. A cutting oil or a lubricant having too heavy a body or too much cohesion with very little adhesion can be wiped or stripped from the metal surface by the cutting tool without properly flow-

ing between the moving surfaces, and thereby fail in its function where a more fluid product would succeed.

All machinists and a great many others are familiar with the fact that a file cuts very little if it has been rubbed with chalk, as the file is held away from the material being cut. Too sluggish or heavy a cutting oil acts in a similar manner and actually can generate heat, by resistance set up, to its functioning in the boundary film condition.

Dispersion of the properties that will permit of very fine dispersion of oil globules is very necessary in a cutting oil to permit of the metal surfaces coming close enough together to permit free cutting. Dispersion is best illustrated by considering a ball one inch in diameter rolling around on a surface, as compared to one hundred thousand little balls made from the larger ball that would then have an area equal to ten times the original exposed surface.

With a cutting oil so finely divided, having the other properties previously mentioned, and having sufficient polarity to be attracted to the metal surface it will very readily function as a boundary film lubricant with very little load required to bring about this condition. Very little friction or temperature will result because of the two films moving in opposite directions as the very fine dispersion supports the surfaces at so many points that interlocking does not take place to any extent.

As a further indication of the ease of movement of finely divided cutting oils we might point out that the finger can be moved through sand very rapidly with very little force required, whereas to move the finger through sizeable stones would be very difficult.

Quite a few of the most outstanding properties of present day lubricants, as well as cutting oils, are brought about by what are known as additives. It is very common for lubricants and cutting oils to have as many as six or more additives, each one with a special function to perform.

Usually the aim is to increase what is known as the extreme pressure properties of the lubricant or cutting oil. Extreme pressure properties are those properties necessary to a lubricant to permit it to function in the boundary film condition long after an ordinary lubricant would have failed

completely and permitted metal to metal contact with bearing seizure, or in case of the cutting oil to permit galling or welding of the chip to the tool with a consequent roughness of finish or tearing of the machined surface.

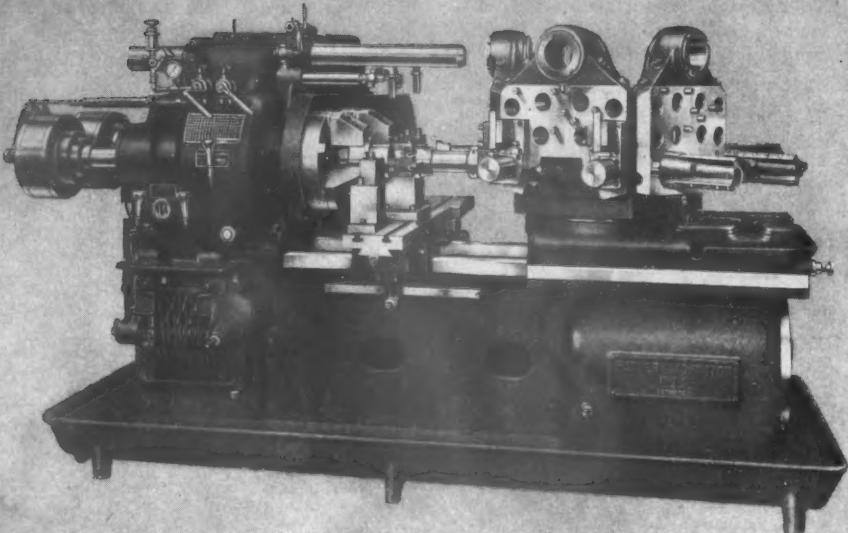
Use of Additives

By the intelligent use of the most common additives the properties of a lubricant or cutting oil can be varied at will to suit the conditions that are to be met. As an example of what is meant, I will point out, that to use an extreme pressure lubricant in a high speed bearing running under very light loads and not requiring anything but ordinary lubrication would result in unusual wear taking place because the stiff, tough film of the lubricant would actually act to cut away or wipe away metal eventually, much as the constant dripping of water will wear away stone. So, therefore it is important to know when to make use of these various properties and to what degree they should be concentrated in the product you wish to create.

Some of the most commonly used additives for both lubricants and cutting oils are materials such as, sulphur, oxygen, phosphorous, chlorine and quite a few of the metallic soaps. Often these additives are not pure compounds but are vehicles containing the element or chemical desired. For instance, oxygen would not be added as such but in the form of an oxygen bearing material.

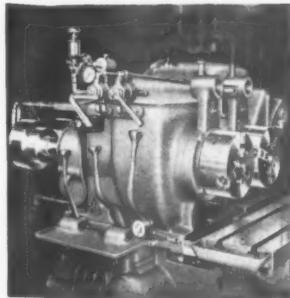
The one product that contributes more of the necessary qualities to a lubricant than any other is the oxidized paraffins, as they are responsible for low surface tension, dispersion and rust inhibiting qualities. These products are made by the oxidation of the paraffins by patent controlled methods. They are obtainable in fluid form as fluid as kerosene, and in semi-fluid and solid wax-like form similar to soft paraffin waxes. They usually have a very pleasant odor and some of them can be made into soaps that will lather in the presence of sea water.

Additives such as sulphur and chlorine can be added in the elemental form, or reacted with suitable materials that will hold them in a stable combination until such temperatures are reached by frictional heat that some small portion is liberated to form what is assumed to be new com-

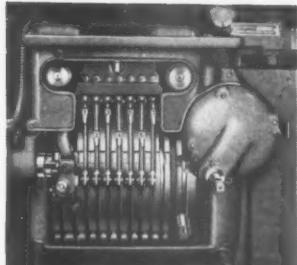


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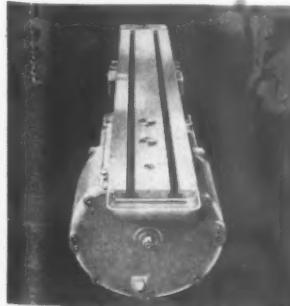
POWERFLEX



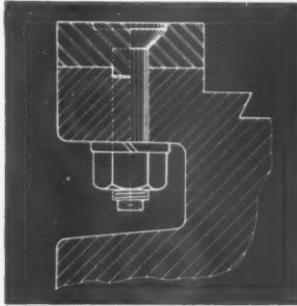
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Complete details will be found in Bulletin No. 111, a copy of which is yours for the asking.

CUTTING OILS

pounds, such as iron sulphide or iron chloride, on the surface of the chip and the tool in the case of the cutting oil, or on the lubricated surfaces in the case of a lubricant.

The metallic soaps usually function because of film strength and unless the film is sluggish enough to readily shear, considerable deformation takes place before the fluid film gives way to a boundary film and considerable heat would be the result. Three conditions that are suitable for the use of high

film strength materials are of a distinct advantage. The stamping or drawing of metal would be an instance, provided the clearance of the die and punch were such as to accommodate a lubricant such as this.

Soluble cutting oils or coolants are made from soap or sulphonated bases to which are added free oils and other additives depending on the selling price or quality desired in the finished product.

Soap base soluble oils usually have

higher film strength properties than sulphonated oils and are more commonly used for stamping and drawing compounds for that reason although it is possible to blend additives to a sulphonated oil to equal or surpass the properties of soaps, but usually at higher expense. Sulphonated oils, (made by treating with sulphuric acid to accomplish water solubility) have properties of wetting and dispersion, polarity, penetration and creep that conventional soaps do not have and therefore are superior soluble cutting or coolant oils.

Stability Required

The application of the cutting oil to the point of the tool in a sizeable stream is desirable and experiments point to the desirability, also, of having a stream of oil directed from the back of the tool, into the space between chip and stock being machined. Rust preventing properties are important and usually accompany all pure oils but usually must be built into the makeup of soluble oils.

Stability particularly against separation and generation of odors is the property of all well made cutting oils although blending oils from two different sources sometimes will cause reactions that release sulphur or chlorine odors if either is present. Chemically active cutting oils are often blamed for skin irritation that afflicts some sensitive operators. This writer believes that oils of very fine dispersion and good wetting properties will carry micro particles of metal in suspension to deposit them in the hair follicles on the skin where they are rubbed or find their way in deep enough to set up irritation. The remedy for this is a constant filtering process for the oil and less use of wiping rags on the hands and arms by the operator.

Proper selection of cutting oils is necessary to economical production and can best be handled by one experienced along that line who is qualified by knowledge of the function as well as the makeup of cutting oil. The day when lard oil, in its pure state or mixed with water and sal-soda, answered for all cutting oil needs has been gone many, many years. The cutting oil of today is performing superior to the one of yesterday at considerably less cost.

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MAY, 1941

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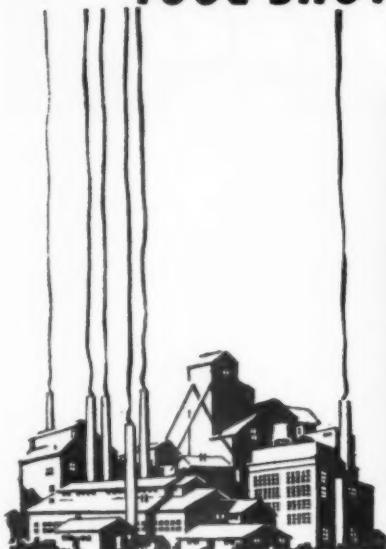
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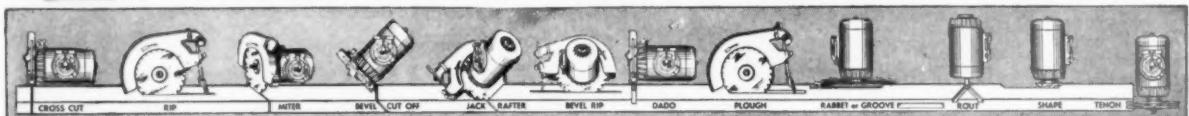
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Production Perspectives

News of Mass Manufacturing Everywhere

THE automobile industry's agreement to cut its production next year 20 per cent in order to increase its output of armaments was announced at Washington last month by William S. Knudsen, director of the Office of Production Management. The action was taken at his request and will result in a limitation to about 4,160,000 of the number of passenger cars and trucks to be produced in the model year beginning Aug. 1. Knudsen said he called the representatives of the industry "to consider the growing defense production job that faces us" and they accepted the reduction "willingly". Questions of the agreement's effect on automobile prices were raised immediately and officials of the office of price control said study has been given to prices, costs and profit relations in the industry.

Next day General Motors Corp. announced that it was discarding all plans for new models for 1943 to alleviate the pressure for machine tools and plants needed for defense. The tooling up for 1942 models, it was explained, is now about done, so that the call upon the machine tool industry would come if the big manufacturer would now start work upon model changes for 1943. "We propose," Alfred P. Sloan, Board Chair of General Motors, said in a letter to Knudsen, announcing the new policy, "to eliminate the yearly model change of passenger cars that we normally make, applicable to the year 1943. This means that the 1942 model, which goes into production this summer, will be continued through 1943." The move, Sloan said, was aimed to help the defense program, by taking some of the load off administrative and technical management and tooling capacity.

EMPLOYMENT at the largest metal trades plants in Western Massachusetts is now at the highest level in history, according to Secretary Allister R. Tulloch of the Western Massachusetts Metal Trades Association.

Tulloch made the statement on the basis of figures sent to him by the 24 metal trades concerns which report employment monthly. These reports are regarded as the employment barometer in that part of the state.

As of April 1, these concerns had 26,084 employes on their payrolls and these employes had worked a total of 1,125,581 man hours during March.

These figures represented a 26 per cent increase in number of employes over the like period of 1940, and a 48 per cent gain in the number of man hours worked.

According to Tulloch, they also topped any other figures on record, even those of the World War boom days and those of the 1929 boom. Most of the reporting concerns are engaged directly or indirectly in defense work, and Tulloch said the employment figures afforded an excellent picture of the boom which the defense program has brought in Western Massachusetts. The reporting firms include such firms as Westinghouse, Van Norman and American Bosch in Springfield, Gilbert & Barker in West Springfield, Worthington Pump & Machinery in Holyoke and Greenfield Tap & Die in Greenfield.

MACHINE tool shipments for March are estimated at \$57,400,000 as compared to shipments of \$29,000,000 for March, 1940, the National Machine Tool Builder's Association reported. The new Federal Reserve Board index of Industrial Production gave a preliminary figure of 143 for March as compared to 113 a year ago.

In Idaho the U. S. Geological Survey has discovered deposits of tungsten ore, a vital defense material. Tungsten, now principally mined in China, is used in making tool steel and in certain types of shell cores.

Initial deliveries of the "350-mile-an-hour plus" Martin B-26 medium bombers are adding new strength to the U. S. Army Air Corps bombardment squadrons. Having passed all tests, the ships are reported rolling off the rapidly expanding assembly lines of the Glenn L. Martin Co. in Baltimore, Md., at the rate of three to five a day. The 13-ton B-26 carries a bomb load greater than many present day heavy bombers. In addition it is armed with 12 to 16 guns, including 20 and 37-mm. cannon, which cover every angle of fire. The plane is manned by a crew of five. It travels faster than most of Europe's pursuit airplanes. It was for the B-26 that Martin introduced a new production system by which 30,000 parts are assembled first into some 650 minor subassemblies, these into 32 major subassemblies, in turn, into completed airplanes. Next summer a new factory with nearly 1,250,000 square feet of floor space, now being built, will be devoted exclusively to the manufacture of this type. And this factory is being duplicated by the Army, under Martin design, at Omaha, Neb., for assembly of the B-26.

COORDINATED PRODUCTION



Drawn specially for "The Tool Engineer" by Ted Petok.
"You know, Joe, sometimes I think we are turning them out too fast."

On the



A

An unusual type of technical session, with questions of a practical nature put to a board of experienced men, was recently staged by Tool Engineers in Toledo. THE TOOL ENGINEER had a stenotypist present to record the discussion and presents it here just as it took place. Readers who disagree with comments are invited to write to the editors including reasonable proof to support their stand.

Editor's Note: Statements presented in this article are the opinions of the individuals, and are not to be taken as indicating the position of THE TOOL ENGINEER.

Chairman Jim McNett: I think we should get the Board of Experts lined up to take the questions to be asked them. We are ready for questions on various problems that have faced all of us.

G. Sisley: I would like to know the cutting speed of cast iron.

Chairman: I think Bob has brought up a good question.

What is the cutting speed for cutting cast iron?

Hayes: What kind of cast iron?

Haynes: Cut it, mill it, turn it, or what?

Chairman: The proper speed for drilling is the question I have in mind. The proper peripheral speed to drill cast iron for practical purposes.

Hayes: I think Sam has the answer to that.

Burgess: If you are going to drill the average gray cast iron—around 110'.

Haynes: I would like to offer an amendment that it depends on the size of the hole you are drilling.

Burgess: A lot depends on the type of machine you are doing the drilling on, and the fixture.

Hayes: The machine can be left out of it a moment and it is a matter of the size of the hole and the kind of finish you want. I know many people today are putting holes in and holding what they thought years ago, were reamed tolerances. I think someplace between 80' and 110'.

Burgess: I agree with Bob 100%, naturally, because I started out with 110' and think I am right. If 110' is too fast, slow it down a little bit; if too slow boost it up a little. If the book says 200', put it at 200' and try it.

A. Bok: Would you have anything more definite if we said milling instead of drilling?

Hayes: I think you would have something more definite to work on because if you drill a hole you have an abrasive factor that does not appear so much in milling. If a hole is from four to six or eight times the diameter of the drill in depth, cast iron has an abrasive action on it. This is not so true of milling operations if it is a cut so it clears itself.

Chairman: George Lamabe, you have had a number of problems I know about at Chevrolet. What is your experience on these things?

Lamabe: My experience has been much the same as Bob Hayes'. The

abrasive action will play havoc with a drill and for that reason you must cut down your speed and increase the feed as much as possible, whereas in milling, the chips go away into space and you can use a higher peripheral speed in milling, but after all the answer is in trying.

Hayes: Other factors are the machine and what you use for fixtures.

Chairman: I think that is a problem that should be very close to you, Art.

Bok: I think this committee would be sticking its neck out in trying to answer the question more definitely as to whether it is drilling or milling. In milling you have a great many factors, whether slab milling, slotting or using a thin saw. I have been on jobs where I said they could mill 100' a minute and found they could do it 150'.

Haynes: I think George and Sam struck a very fine note when they said that you are supposed to try these things and I think that should be the answer to the rest of the questions.

Chairman: I think you have covered that question 100%. We did not expect to be able to get any steadfast answer to the questions asked tonight because we all know things that were done in the machine industry ten

Practical Tool Engineering Quiz

THE BOARD OF EXPERTS

Irwin B. Hayes

Robert B. Haynes

Samuel W. Burgess

Edmund E. Burke

George Lamabe

Tool Engineer, Electric Auto-Lite Co.

Master Mechanic, Spicer Manufacturing Co.

Tool Designer, Electric Auto-Lite Co.

Sales Manager, Kent-Owens Machine Co.

General Supt., Chevrolet-Toledo Division

years ago that are just a bunch of nonsense today. Our idea of this meeting was not to speak specifically that you could drill cast iron 110' a minute or mill it at any set speed or feed but to get from this Board of Experts what their experience had been on different jobs. We don't expect them definitely to state you can do so and so, because they will probably go in their own plant and find it cannot be done. They have given us their opinion and we have covered the first question thoroughly.

Bok: I am quite sure this question will be brought up again—I am quoting from THE TOOL ENGINEER, August, 1939, Page 18, on Milling: Grey Iron—100' a minute; hard cast iron—75' a minute. That's something to start from.

Haynes: Before we drop the subject, this is definite as far as I am concerned. There are two times in any shop that a Tool Engineer is concerned with speed—once when he is estimating and must tell what it will cost to drill a hole. In that case I have used 65' a minute because in all cases I have run across, unless it is stove lid iron, that speed gives you an edge to work on, and then you go and get your 110' or 120' or whatever you can get.

Chairman: I think we are open for

the next question now if you please.

N. Hampshire: I would like to know how to turn a round rod $\frac{1}{4}$ " in diameter by 3' long in an ordinary lathe, to turn the diameter smaller.

Chairman: Could you be more specific? What kind of limits?

N. Hampshire: Fairly close—.002.

Chairman: We will say take a skin cut and hold it to .002. I think the question is a good one.

Burgess: If a lathe is the only piece of equipment in that shop and you have a traveling steady rest, that is about the only way.

Hayes: How about a hollow mill?

Haynes: A steady rest all around your tool and eight inches behind and ahead of the tool is about the only way I could see that you could handle the job. How did you do it?

Chairman: George Lamabe, did you have another idea on it or a suggestion?

Lamabe: I was not going to suggest anything on that.

Chairman: Apparently you asked one they did not like. If that problem has to be done it is apparently one our Board doesn't want anything to do with. Have you had any experience with it in a lathe?

N. Hampshire: You can turn it in a lathe holding it to .002. Take an

ordinary tool and a steady rest or a piece of scrap iron and drill a hole in it and fasten it up against your bit and let it follow the bit on through.

Chairman: A steady rest connected to the tool itself? Sam said put a following steady rest on it.

Haynes: Your tail stock is merely a thrust agent.

Chairman: Let's hear some more questions.

Feeak: I should like to know if the Board can give me some help concerning black bakelite, a highly polished surface with .010 hard crust on it, $2\frac{1}{2}$ " in diameter. I should like to know how to drill a hole without breakage.

Haynes: How is your drill ground?

Feeak: That's what I should like to know—what speed, what kind of drill, and what would you recommend for drilling the hole?

Hayes: We have tried a lot of things on that job. Because of the scale it lets go. You might have a bushing directly under the piece to have the piece rest on a bushing.

Haynes: If you are doing it on a straight feed drill press or cam operated job, have you tried feeding the drill through and coasting the last $1/16$ " so you are easing the drill through?

Feeak: Nobody should know better

TOOL ENGINEERING QUIZ

than you because we are doing it on a machine you built.

Haynes: You are talking about distributor caps. I have had better ideas in the last twenty years.

Burgess: I am not very familiar with the job but wonder if it could be done this way: We will say it is a $\frac{1}{4}$ " hole. Suppose you use a dural drill cutting $\frac{3}{16}$ ", following up with $\frac{1}{4}$ " so you are both drilling and reaming at the same time. Could it be done that way?

Haynes: I don't think so.

Chairman: George, have you run into that?

Lamabe: Not on bakelite.

Chairman: Art Bok?

Bok: Not me.

Haynes: If they have not changed the machine since I built it fifteen years ago, it is a cam machine. As I recall, you practically punch that hole through. I would change the cam and make it a drilling cam for the last $\frac{1}{32}$ ".

Feak: We have done that.

Bok: Would it be practical to put something behind that hole?

Feak: An expanding bushing, drilling both holes at once would mean something that would expand because of the tolerance inside the cap.

Chairman: We have had a number of points on that and have run out of time on it. I don't know if you got any answer that was a help on it or not.

Feak: Might I give you my experience? What little I have found out about it. I don't claim to have a solution: With a $\frac{1}{4}$ " drill running 8500 r.p.m. and going through as a punch press, as Bob said, with the drill ground at a sharp angle, with a lot of r.p.m.'s. and tungsten carbide, we do not ship many today.

Haynes: I object, he knows the answer.

Bok: What is the angle on that drill?

Feak: Greater than a bakelite drill. As far as the hole, we are not up against size.

A. Bok: What feed do you use?

Feak: I don't know that, I don't know if there is a stop watch that would catch it. It is just "plunk."

Chairman: How about another question?

R. Kurtz: I would like to have the Board explain Pulsation and Projection type welding.

Chairman: Sam Burgess.

Burgess: The pulsation almost explains itself—meaning a rhythmical motion. Instead of turning the power on, you just give it a series of shots. You may only give it the power twice. You may find where you only give it power once, if you will split that cam and make it two cams you might lick the job. If you can break it with a one-shot weld, that might be the answer to the job. This pulsation welding is very new but it has been the answer to a great number of jobs all over the country. There are instruments on the market today made by G. E. and other companies; if you want three cycles on and three cycles off you can secure that. You set the machine and there you have it. They use vacuum tubes. If you split that cam and throw the switch on and off you have the same thing but you must keep the pressure on. There are three things in welding: Pressure, power,

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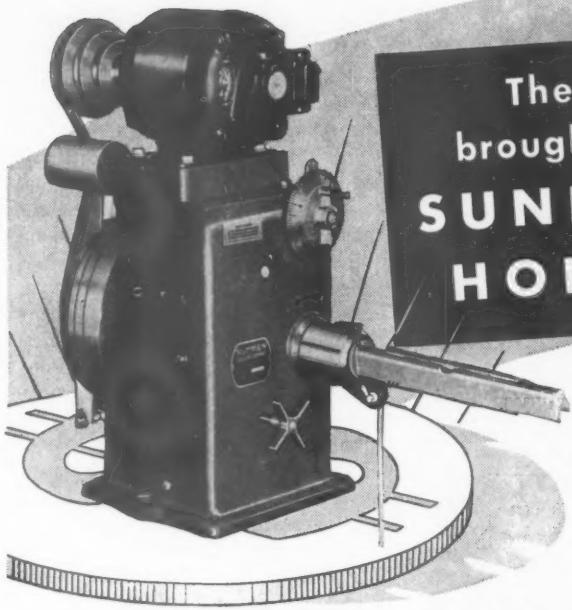
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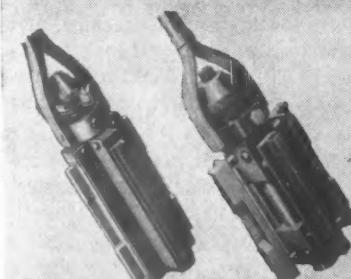
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TOOL ENGINEERING QUIZ

and time. You must supply your pressure before your power, and cut off the power before the pressure and also keep the points as cool as you can. Water cool them or you will run into trouble all the time. Drill up in the inside and shoot the water right up in the inside.

You can use pulsation at the same time as projection. If you want to weld two pieces together, always put the projection on the thickest part—a pimple. In welding two pieces, for

about $\frac{1}{8}$ " stock the height of the projection would be about $1/16$ " and the diameter between $3/16$ " and $\frac{1}{4}$ ". You want to start from that; you might do better if you enlarge your projection. The projection comes in, when you are welding two pieces together and have uneven surfaces and when the power goes through those projections it brings the metal into a plastic stage.

Chairman: Irv, do you have anything to offer?

Hayes: Nothing except you use the pulsation with the projection.

Burgess: You might also find that in welding two pieces of thin stock the diameter should be about two-thirds the thickness of your stock and the height about one-third. Again that is just something to start from. The pulsation just preheats it. I don't think you use any more power.

Hayes: You get the same time per weld.

Franklin: Do you hold your pressure independent of your pulsation?

Burgess: You must hold the pressure through the weld, by cam, hydraulic, or air.

Franklin: What effect does plating have on it?

Burgess: I find it just burns it off when you apply the heat.

Franklin: How about scale?

Burgess: Same thing.

Chairman: Any kind of plating?

Burgess: I have tried it with chrome and cadmium plating. It is also done with tin plate.

If you keep your projections close, and have a piece 1" wide and put the projection in the middle you will get a lot of splash but if you put it near the edge it will not splash. You will only see the burn where it joins in the center. In airplane welding today you cannot see the welded point. You might refer to pulsation welding as woodpecker welding.

Chairman: I think we had better have another question.

H. Golden: What experience have you had in turning steel with tungsten carbide tools? What kind or grade of tungsten carbide have you used?

Chairman: Speeds, feeds, etc.?

H. Golden: You don't have to actually turn it.

Lamabe: There is a starting point again. Probably the first requirement is a good spindle and a good slide—in other words a good machine, and the amount of stock you are going to take off. It has been done rather satisfactorily. As a general purpose, start with 78-B.

Chairman: Is it practicable to apply tungsten carbide to the job, steel on gears?

Lamabe: Yes, we are doing a fairly good job.

Haynes: At the risk of being old-fashioned, I am going to say I don't think tungsten carbide on steel is



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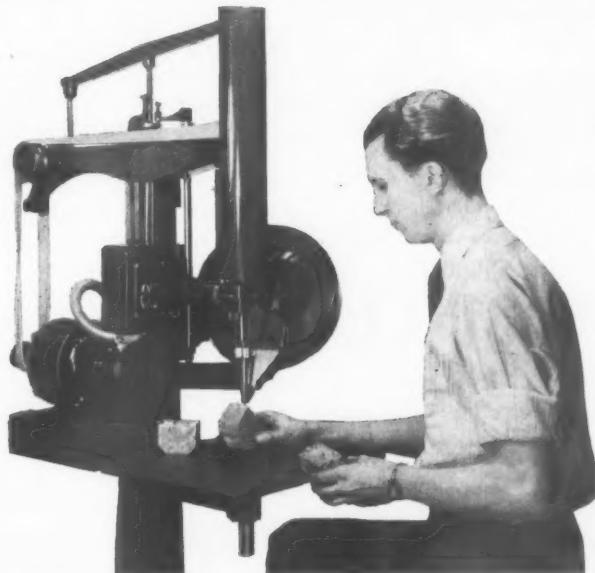
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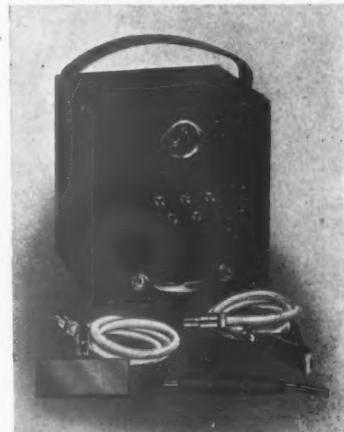
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worth a damn; I think you get far better results, in the average condition, both from the cost and upkeep end of it, in tungsten cobalt hard steels than you will with a centered brand of tools. I think they are good for light finishing cuts where you want to leave a finish which makes the inspector think you have ground it, but when you want to rip $\frac{1}{4}$ " off the sides I don't think it is there.

Chairman: I think Bob opened it up further than we thought and it is

a good one to open up. Let's cut it loose, how about carbide tools on steel?

Franklin: Don't you think it is because machine tools do not obtain the proper speed?

Haynes: Partly, but I have had a chance to do some of the first prolonged experimenting and I did it on brand new equipment. In our own place I see it and I don't think it is a matter of having it rigidly set up, I think it is a matter of the tools itself.

We have a job on which we have tried to find some way of doing it, where we must bury a deep slot $1\frac{1}{4}$ " to $1\frac{1}{2}$ ", about $\frac{3}{8}$ " wide when it is finished. It means the roughing tool is $5/16$ " wide into a solid steel forging. We have tried tungsten carbide and when we get through we get the best results out of ordinary good grade of high speed steel.

Lamabe: I think that's right, although we are doing a good job in one instance on tungsten carbide. With steel such as 46-20 it is hard to get the chips off. There is far too much build-up of chips on tungsten carbide on a lot of those jobs. You might get one job of turning where you get cooling in the right spot, but in a job like Bob described it is very likely that tungsten carbide would be an absolute failure.

Haynes: Probably one reason tungsten carbide does not work out is because the fellow on the machine cannot work it out with tungsten carbide but you give him another piece of steel and tell him to do it this way; when you are not around he does it some way so that it works. You cannot do that with tungsten carbide. I think tungsten carbide is defeating itself in that respect. Art, you use a lot of it on the malleable jobs.

Art Bok: We have pretty good success on the malleable jobs, and cast iron.

Chairman: Irv, how about automatics?

Hayes: We don't use any on automatics. We have some stellite but no carbide.

Chairman: Ed, how about steel?

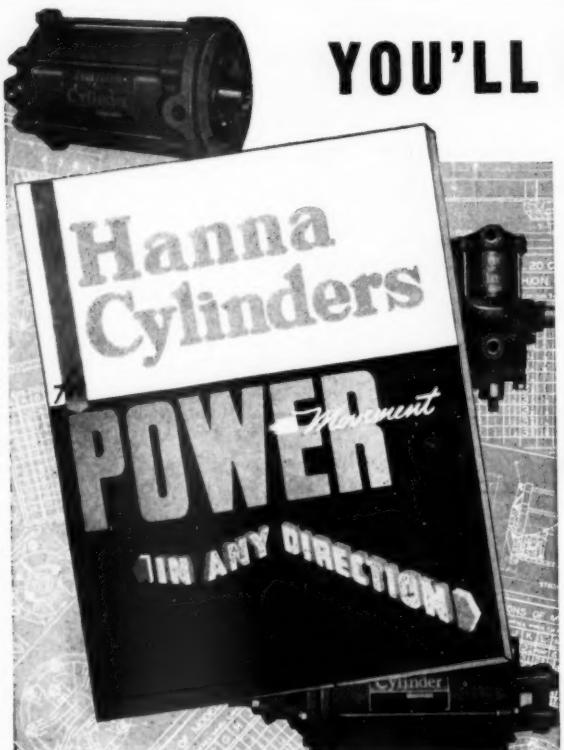
Burke: Many of the same remarks on turning also apply to milling. My experience has been that it is used more on cast iron than on steel. The conditions have to be highly standardized, everything uniform, and a large production, to set up for tungsten carbide. Our experience on using tungsten carbide in milling is that it is talked about more than it is used.

Chairman: Let's have another question for discussion.

C. Cowell: On indexing, on what general type would you use a trunnion, rotary table, and where a conveyor? Where would you use them, secondary operations or where?

Hayes: What is the application?

C. Cowell: There are supposed to



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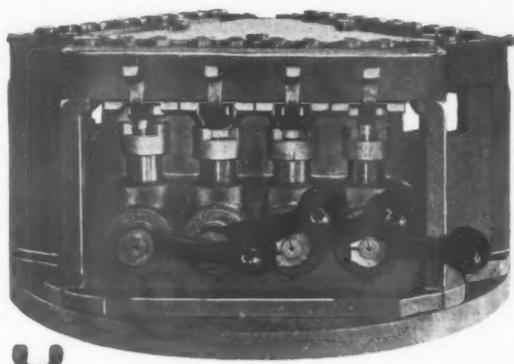
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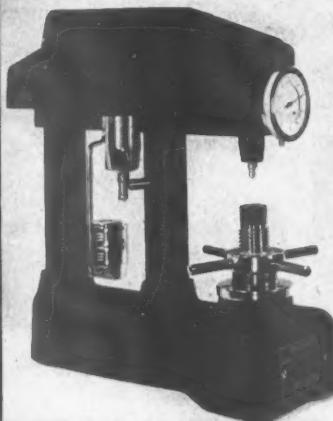
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TOOL ENGINEERING QUIZ

be three types. This was given as three forms of indexing. I don't know what a trunnion is.

Burke: I should know but I am stumped on the trunnion type.

C. Cowell: Is it like the barrel type?

Haynes: Yes.

C. Cowell: How do you apply the conveyor type?

Burke: Like feeding a punch press on strip stock. It would depend on the character of the work.

Haynes: As I get it, the conveyor means like in United Shoe Machinery where they deliver the rivets down the slide.

Chairman: Conveyor type would be feeding from roll stock.

Burke: I was going to elaborate on that: Trunnion type, horizontal type axis, and vertical type, you could use that milling at an angle on which a shuttle type could not be used.

Haynes: The definitions are not definitive because in an indexing head it

is used in a horizontal position and it is a rotary type of indexing so you cannot say it is definitive.

Chairman: George, you had something you were going to bring up.

Lamabe: The nature of the job he intends to do would have to be known first.

Chairman: The application of the job is the one that will determine the type of indexing. A trunnion type would be where the bearings are suspended outside the part being rotated, whereas rotating is where the axis is through the center.

We have time enough for one more question. We have had some mighty good ones.

A. Kuhn: What is the quickest way of putting a superfinish on a cast iron plate?

The part is a pressure plate in a clutch where it must be extremely smooth. The quickest way to put a smooth finish on a cast iron plate which might be used against a clutch plate?

Chairman: He said a smooth finish. That puts the question up to the Board.

Haynes: I don't think he means it like you are taking it. A finish such as we used to get, when they criticised the finish, by loading the wheel and rubbing the shaft and putting a shine on it—that is not what he wants.

A. Kuhn: I don't mean a smooth tool cut finish.

Haynes: Something between a 22 and 25 grinder for superfinishing, and the quickest way.

Chairman: I think you should answer that Art.

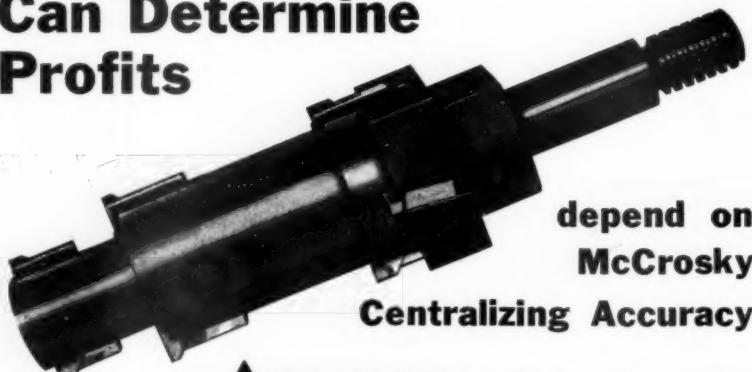
Art Kuhn: We are putting a smooth finish on but it is costing too much money.

Haynes: I don't want to expose all my cards here because you sell superfinishing equipment.

Chairman: I did before Uncle Sam told us what to sell.

Haynes: It is a flat nickel disc, heat treated, about 14" in diameter, with a 6" or 8" hole in it and the torus must be a finished plate to get better action out of the clutch. We did not want to do it but in order to satisfy the customer we got somebody to do a little superfinishing for us. I know a concern that is building a machine to do it inexpensively and rapidly. It is a large stone on the surface like put-

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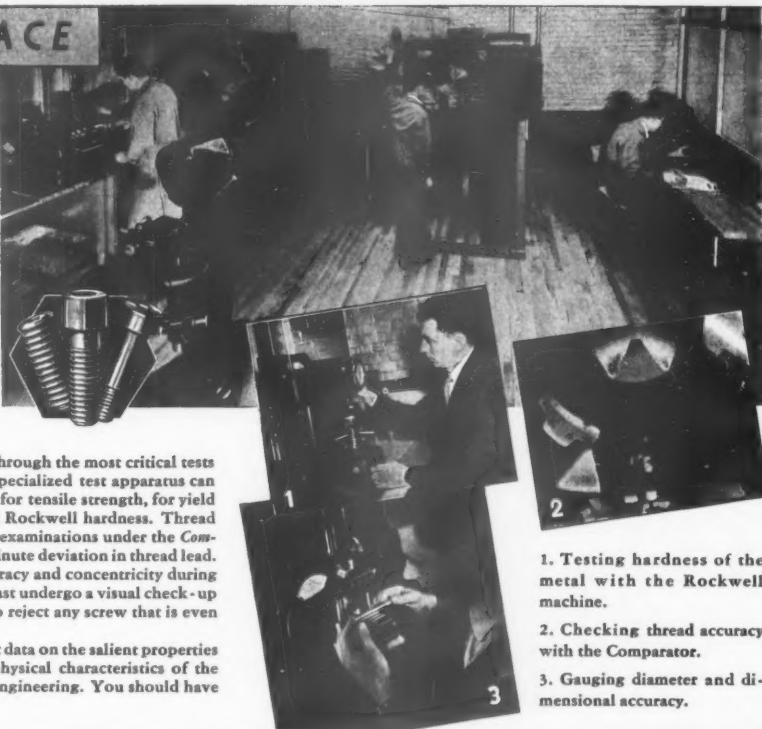
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TOOL ENGINEERING QUIZ

ting a stone on a shaft to finish a diameter. That's all I know about it.

A. Kuhn: Do you mean that it would be advisable if that machine were worth 50% or 60%, to buy a machine?

Chairman: That question was put to the Board. I might say this: As you know there is an outfit doing a lot of that work on clutch plates, Borg & Beck in Chicago. Borg & Beck have a machine tool company spending a lot of jack trying to find out what you

are talking about and they have been fairly successful. That would be my answer on that question.

That question was taken care of in short order. Let's have another one.

R. Place: You mentioned a torrus, what is a torrus?

Haynes: A torrus is that area and space swept out by a ring revolved around an axis for a complete revolution.

Burke: He is talking about a doughnut.

Haynes: That is a practical example.

A. Kuhn: Due to the amount of round broaches used, does anyone on this Board know of any way of automatically sharpening an automatic broach if you could set the machine to a certain amount of teeth?

Haynes: Yes, there is a way of doing it but it presupposes a broach as exact as the machine is. It is the same as on a hob within a few thousandths of being on a degree. Then the machine will do it. There is such equipment. It is not being used, largely because nobody uses a broach that way. From step 10 to 11 is the same as from step 7 to 8. What they are interested in is the size of the hole. If you make the broach you can buy a machine which will index it and definitely grind every step in it.

A. Kuhn: Would it pay to make a broach that accurate? Is the grinding method cheaper than hand grinding?

Haynes: I do not think it has paid as yet because the size of each step and size in diameter is more important than the distance. You don't care if the distance varies $1/16$ " or $3/4$ ". Your cutter grinder is very apt to grind the job so that he gets each step running as nearly right as he can. If you went to the manufacturer and told him that you were going to re-sharpen the broach and that you had to have the teeth within plus-minus .001 he would say ok but the cost would go way up.

Hayes: What would be the point in that?

A. Kuhn: Let one man run three machines.

Lamabe: You are not going to take as much off the finished teeth as the rough.

Chairman: Round broaches, not flat broaches.

Burgess: The expense of the broach would go up so far that the life you would get out of it would not be worth what you would put into it. The spacing of those teeth from one to the other will not have any ultimate result when it is finished.

Chairman: George, do you have anything to offer on that?

Lamabe: I do not see any advantage. I think you would lose money on the broaches.

Chairman: Gentlemen, I think that is all we will have time for.



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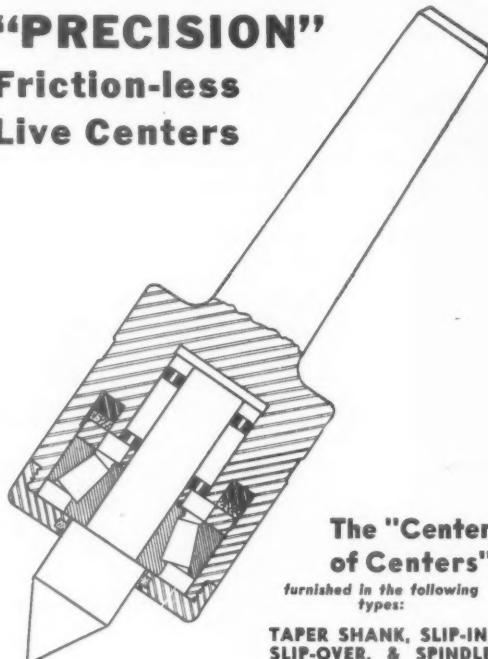
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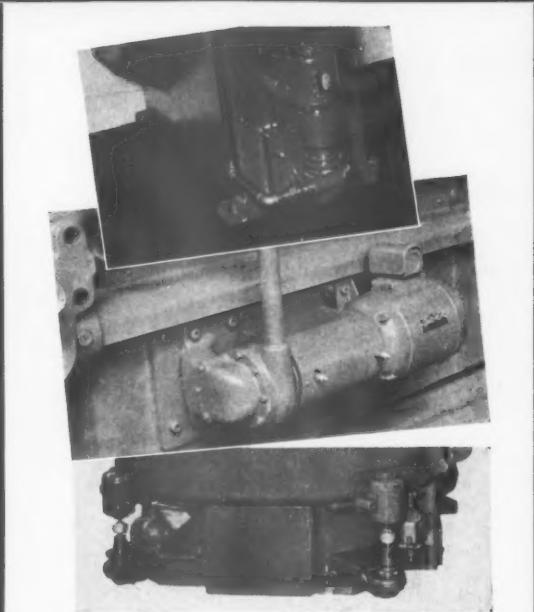


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Tool Room Machine
A four in one combination.

60 degrees either side of center. Feed screw handles have adjustable micrometer dials of large diameter.



In addition to the complete line of electric arc welding equipment, extensively being used on defense work, Hobart Brothers Company, Troy, Ohio are building power units for operation of antiaircraft and search-light control. These power units are being built in a new building especially erected for the manufacture of Government Defense Equipment.

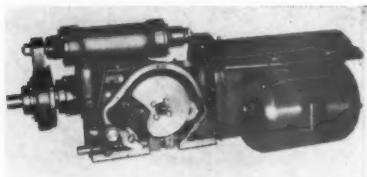
ECLIPSE (E31) SHELL SPRAYER

A fully automatic machine to spray coat the inside of projectiles has been built by the Eclipse Air Brush Company, 400 Park Avenue, Newark, New Jersey. The machine sprays the inside of 155 mm. shells at the rate of 500 an hour, although this same type machine can be built to handle any size projectile or other cylindrical object.

The shells are picked up by metal arms from the conveyor belt, carried along in a horizontal position on the machine to a point in front of an automatic spray gun fitted with an extension nozzle. A master switch trips the trigger on the gun as it starts to move forward, and a rotating device, with which the gun is synchronized, spins the shell to insure an even coating. As soon as the nozzle has been withdrawn from the projectile, the shell moves along, making room for the next one.

EMPCO (E32) UNIT MECHANISMS

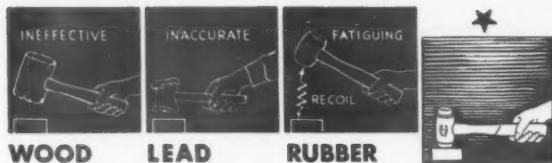
The Enterprise Machine Parts Corporation, 2733, Jerome Avenue, Detroit, Michigan, has bought the Millholland patent rights and is now building these unit mechanisms and marketing them under the name "Empco". These units are said to lend themselves to a wide diversity of adaptations for drilling, milling, tapping, reaming, and spot-facing



Unit Mechanism
Especially designed for heavy work.

(either singly or in multiples) and are used to form machines for speedy productions.

Empco units are designed especially for heavy work. The specially designed cam is attributed with the great speed with which these units are said to perform. The cam, which utilizes the pneumatic counter-balance, has a chip cutting efficiency of 80 to 88% which means that idle time has been considerably reduced.



WOOD LEAD RUBBER

makes a clumsy tool that will split and crack. *metal heads have edges that turn, break and fly off.* *makes a bouncing head that chips and smears.*

RAWHIDE

heads and faces stay accurate, absorb shock, and wear longest.

★ Chicago Rawhide Hammers and Mallets are the tools for striking hard accurate blows safely on any surface that must not be cracked, battered or marred. The tough Java Water Buffalo hide, coiled, compressed and treated for long life will not split, break or even dent, and has resilience to absorb rebound for easier, accurate blows.



These hammers and mallets with genuine rawhide heads are quality tools for thrifty mechanics. Sold by industrial supply houses everywhere.

These replaceable faces of genuine rawhide "stay put" in the indestructible malleable iron heads of Chicago Rawhide hammers for thousands of accurate blows. No shifting—no separating—always true.

CHICAGO Rawhide MFG. CO.
1393 ELSTON AVE. - CHICAGO - U.S.A.

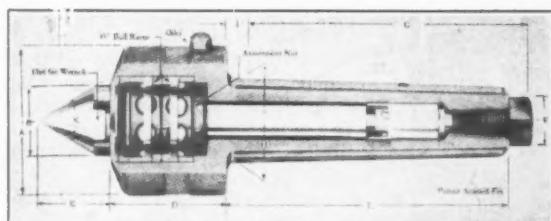
The Improved Nielsen Live Centers

LOAD CAPACITY—200 TO 40,000 LBS.
AT 100 RPM.

HAVE ADJUSTMENT TO TAKE UP WEAR
AND PRELOAD BEARINGS

STANDARD MORSE TAPER No. 2 TO 6
IN STOCK

WRITE FOR CATALOGUE AND DISCOUNTS

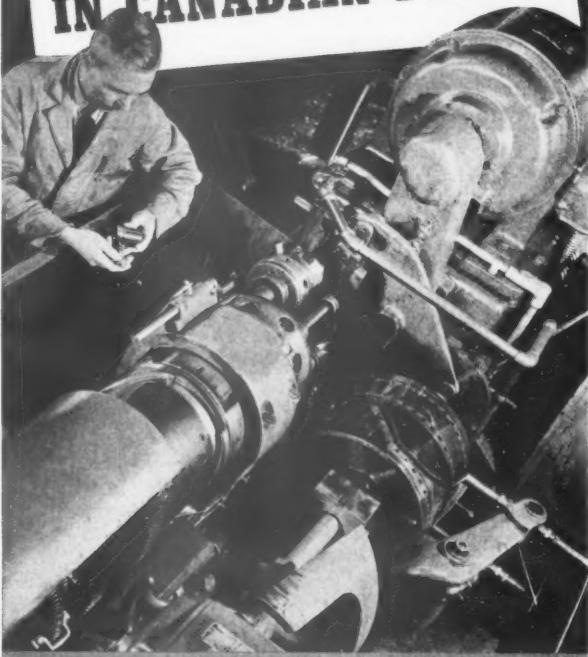


NIELSEN, INCORPORATED

LAWTON, MICHIGAN

MAY, 1941

STAY BOLT SLEEVES MADE ON MODEL A IN CANADIAN PLANT



♦ In the Canadian General Electric Davenport Works at Toronto is a 2½-inch Cleveland *Single Spindle Automatic* kept busy making locomotive stay bolt sleeves. Lots range from 2000 to 3000 pieces, and a rate of 17 pieces an hour is easily maintained. Stock used is 1 3/16" X 131/4 bar, and operations consist of feeding out, drilling and turning, drilling and forming, taper counter-boring, threading and parting off the bar. A tapered thread, 12 to the inch, is produced. ♦ On jobs like this a Cleveland effects such economies that no other method of production is comparable, and on short run, small lot production, such economies are imperative today. Easily cooled up, readily accessible for adjustment, Model A Cleveland *Single Spindle Automatic* requires little down time to be charged against it and can be kept steadily employed. Ask for particulars.

THE CLEVELAND AUTOMATIC MACHINE CO. • Cleveland, Ohio

Sales Offices:
NEW YORK, 50 Church Street • DETROIT, 2842 Grand Boulevard
CHICAGO, 565 W. Washington St. • CINCINNATI, 314 Americom Bldg.

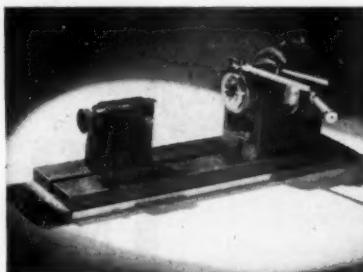
CLEVELAND
Single Spindle
AUTOMATICS

IT'S NEW—

HARDINGE (E33) COLLET INDEX FIXTURES

Two new Hardinge Collet Index Fixtures with sub-base and tailstock are announced by Hardinge Brothers, Inc., Elmira, New York. These fixtures are said to quickly hold work accurately, and at the same time provide a rapid indexing.

One model is designed for tool room and inspection work, while another model has additional features making it suitable for production work. This latter fixture has a preselecting arrangement



Index Fixtures
For production, preselection.

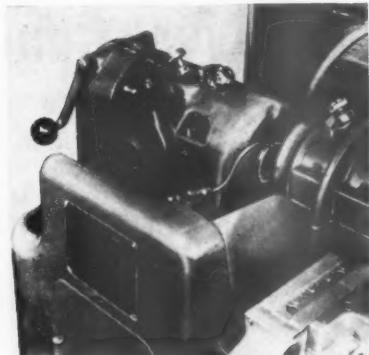
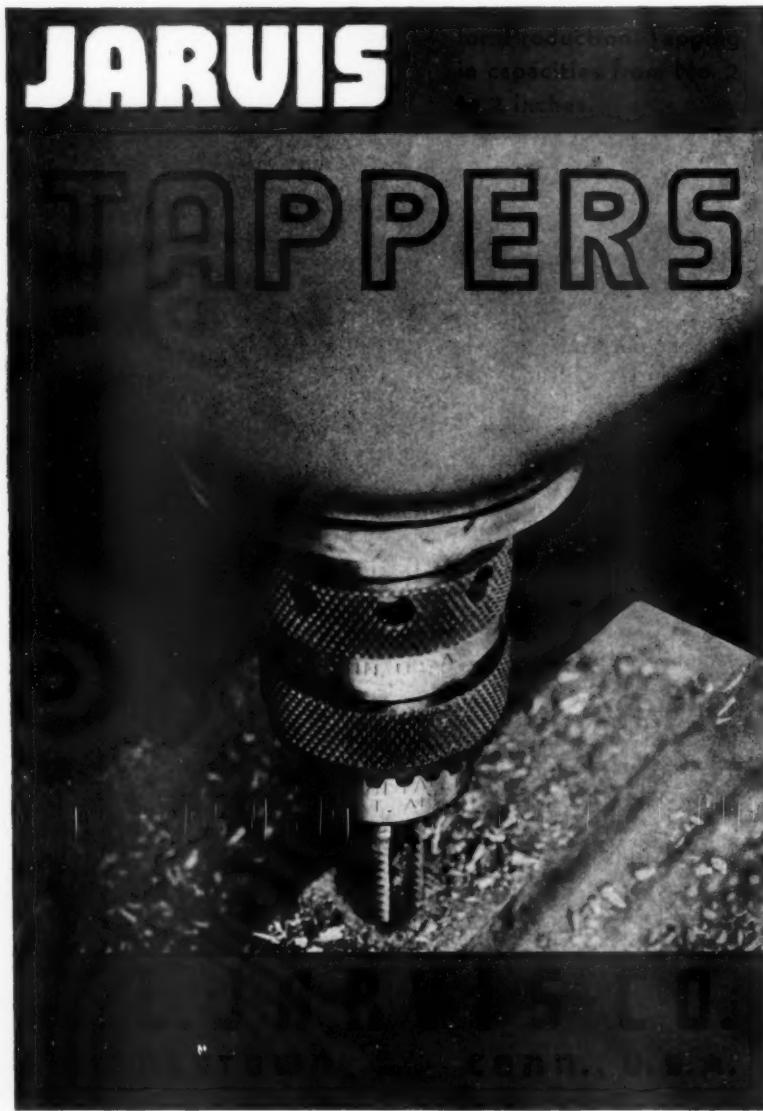
on the hardened and ground index plate. The index plate has a screw in each of

the 24 index holes so that holes not required for a particular job can be blinded. As an example, the screws in the plate can be arranged so that the index pin can enter in six holes only, or four only, or any other number divisible into 24, with even and odd spacings. This means that the index plate holes can be arranged for any one job as though the index plate were made for that job only, therefore the operator cannot make a mistake when indexing.

LANDIS (E34) RACE-A-WAY GRINDER

A new machine for the production grinding of the raceways of small ball bearing outer races is announced by the Landis Tool Company, Waynesboro, Pennsylvania. It is intended for the smaller races up to and including the No. 204 size. Double row races may also be handled.

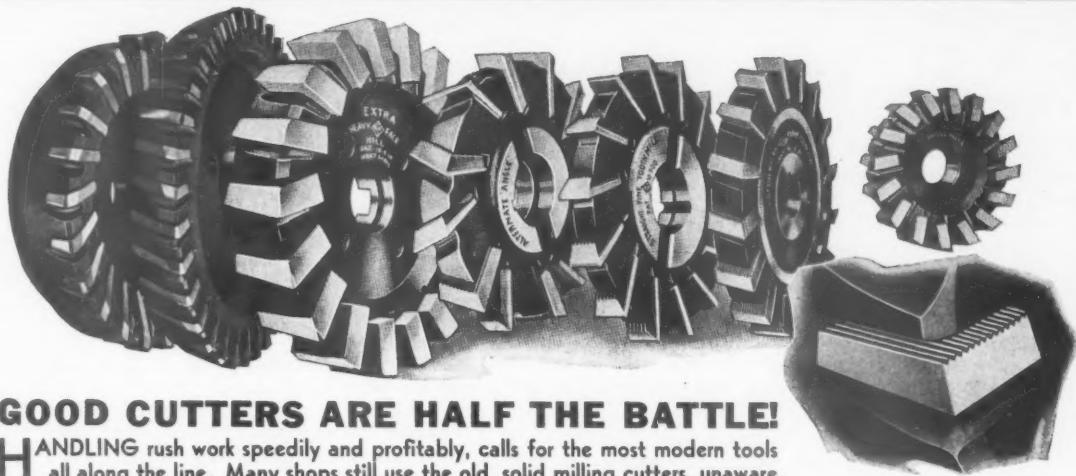
The machine is equipped with the Landis-Solex sizing device which in combination with an electric timing device permits the performance of three operations during the same grinding. The race is rough ground up to the point where only a small amount of stock is yet to be removed. Grinding continues, but at a slower grinding feed which is equivalent to what would ordinarily be the finishing operation. With the work practically to size, grinding feed and



Race-A-Way Grinder
Entire cycle is automatic.

work head oscillation stop. The work head is centered and for a fixed but exceedingly brief period of time the wheel sparks out until the work is down to exact size.

The entire grinding cycle is automatic once it has been set in motion, it being necessary for the operator to do nothing but load the work and depress the cycle start button. The wheel spindle operates at 50,000 R.P.M., this high speed is required so that the exceedingly small diameter wheel used will produce races rapidly.



GOOD CUTTERS ARE HALF THE BATTLE!

HANDLING rush work speedily and profitably, calls for the most modern tools all along the line. Many shops still use the old, solid milling cutters, unaware that their inefficiency is not only expensive, but also the very "bottle neck" that industry deplores!

The cutters shown above were designed especially to speed up and improve the milling, reaming and boring demanded by the exacting manufacture of armament. In these tools, only the blades are made of the more expensive cutting steel; and, being instantly adjustable in line of wear after grinding, afford a flexibility of operation that soon shows up in time and money saved.

The cutter blades lock firmly in place without screws, pins or wedges. This allows for closer tooth spacing when necessary, and the mating serrations in the blade permit adjustment in line of wear.

THE O K TOOL COMPANY, SHELTON, CONN., U.S.A.



INSERTED-BLADE METAL CUTTING
TOOL SYSTEM

ARE YOU DOING ANY OF THESE OPERATIONS?

if so

CERRO ALLOYS
can save time
or improve
quality

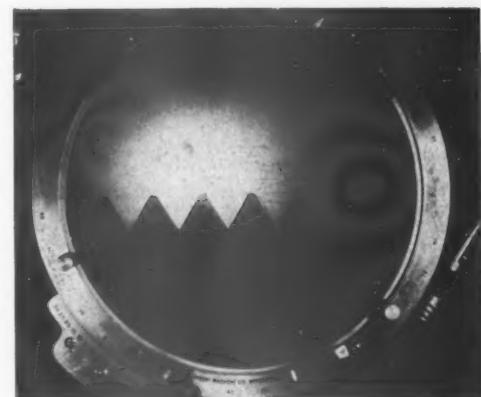
These folders
tell you how

Securing punch and die parts
Anchoring stationary machine parts
Making engraving machine models
Holding permanent magnets
Holding chuck jaws for irregular shapes
Reclaiming cracked dies
Filling blow holes in castings
Bending thin-walled tubes to small radii
Bending metal moulding
Making plated shells
Making templates for spotting forming dies
Reproducing master patterns
Proof casting for forging dies, molds
Electroforming molds
—or what have you?



Send for them today.
Mention applications in which interested

CERRO DE PASCO
COPPER CORPORATION
40 WALL STREET NEW YORK, N. Y.
BRITISH ASSOCIATES: MINING & CHEMICAL PRODUCTS LTD., LONDON
CANADIAN DISTRIBUTORS: DOMINION MERCHANTS LTD., MONTREAL



SCREW THREAD

Ground by

ACME INDUSTRIAL COMPANY

Makers of Standardized Jig and Fixture Bushings

208 N. Laflin St. Chicago, Ill.

MONroe 4122



IT'S NEW

DURO DRILL PRESSES

(E35)

New Multiple Spindle Drill Presses are supplied in two or four spindles by the Duro Metal Products Company, 2649 North Kildare Avenue, Chicago, Illinois. This arrangement enables operator to perform drilling and tapping operations speedily and economically. Their initial cost is said to be just a fraction of the cost of heavier presses and the power consumption and maintenance cost are said to be negligible.

Each spindle runs on four sets of permanently lubricated N.D. ball bearings. Splined shafts permit long travel of chuck. Jacobs chucks take up to $\frac{1}{2}$ inch.

MAJESTIC INTERNAL GRINDER

(E36)

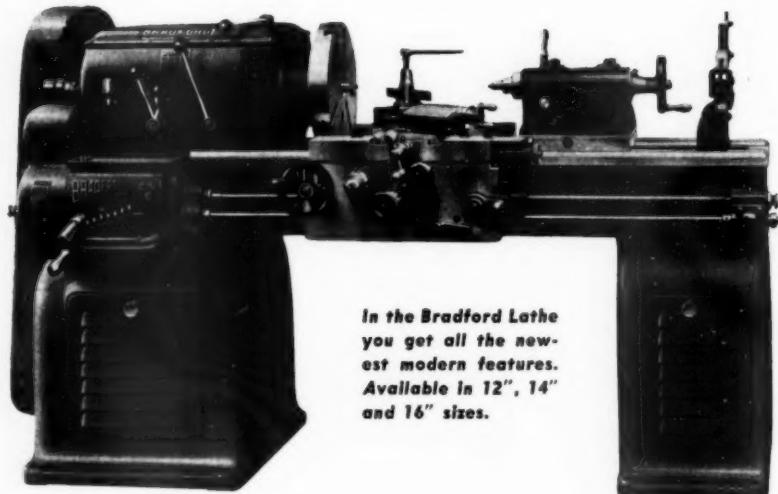
A new internal grinding machine is now being manufactured by the Majestic Tool & Mfg. Co., 2950 E. Woodbridge, Detroit, Michigan. The spindle, spindle bracket, and motor are one unit and are mounted on the cross slide. The

cross slide is of a dovetail design with gib and is actuated with rack and pinion through worm gear and mounted on handwheel shaft.



Drill Presses
In two or four spindles.

Be Sure of Better Work-Faster



In the Bradford Lathe
you get all the newest modern features.
Available in 12", 14" and 16" sizes.

Better work, faster and at lower cost are factors of supreme importance to Tool Engineers whose production is constantly being stepped up by unprecedented demands. In the New Bradford Geared Head Lathe, you have positive assurance of quality throughout, plus versatility, capacity and power to take a large variety of production jobs. Rugged construction, nickel alloy steel gears—with 12 speeds from 16 to 400 R.P.M.—precision taper roller bearings, unlimited range of feeds and speeds are further added Bradford values you will want to investigate before you place an order.

Write for illustrated bulletin that gives
you full details and specifications.

Also manufacturers of Unit-Type Drilling and
Tapping Equipment



THE BRADFORD MACHINE TOOL CO.
CINCINNATI, OHIO
PRECISION TOOLS SINCE 1840



Internal Grinder
The cross slide is dovetailed.

mounted by grease seal ball bearings. A diamond dresser is bolted to the top of the table in the position required. The work spindle is hollow and the hole in the nose is ground to take collet. The outside of the spindle nose is threaded for adapted space plate.

THE TOOL ENGINEER

Information

about a cutting tool that does
the machining job in less time

TECO Carbide Cutting TOOLS

TIME saved in machining, annealing and tool grinding, with TECO Carbide Cutting TOOLS, increases the productive capacity of your machines. This speeds production immediately, reducing fabricating costs all down the line. TECO Metal saves cutting time in many ways. Combining a near diamond hardness with unusual toughness, it machines steel 4 to 11 times faster than high speed steel, cuts unannealed forgings, roughs and finishes in one cut. Also, through longer tool life, you get more continuous production per hour with TECO Carbide Cutting TOOLS. Let us prove this to you, along with TECO's many other cost-cutting advantages that mean extra shop dividends.

There is a standard grade of TECO METAL to meet the characteristics of almost any machinable material. Ask for a shop demonstration without obligation. For information concerning special applications and specific recommendations, address

TUNGSTEN ELECTRIC CORPORATION • 570-39th STREET, UNION CITY, N. J.

Branch Office: 2900 EUCLID AVE., CLEVELAND, OHIO

Pioneers in Tungsten Carbides for Over a Quarter of a Century

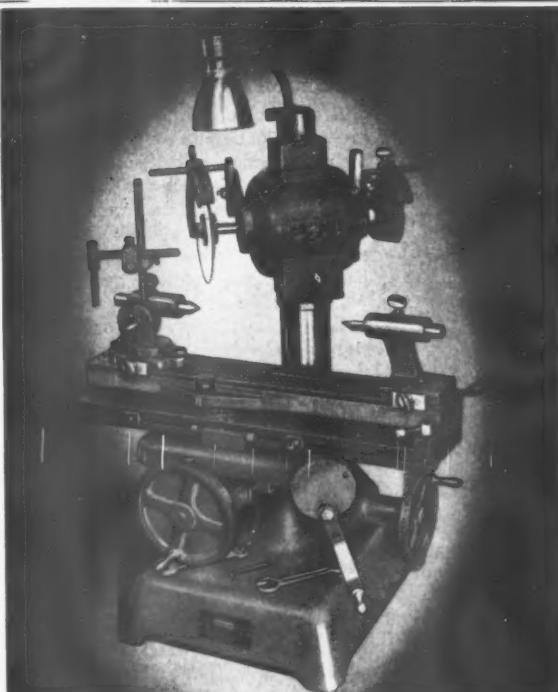
Tungsten Electric supplies carbide blanks, tools and bits. Wire and bar dies, tubing, extruding and sizing dies. Also special tools, such as spot facers, reamers, combinations, broaches, form tools, etc.

PROMPT, EFFICIENT, SPEEDY
TUNGSTEN ELECTRIC SERVICE
means more to you now than ever before.

CONSULT US



TECO CARBIDE TOOLS pay dividends!



Manufactured by the
K. O. Lee Company
Aberdeen, South Dakota

TCG-41

W. M. ZIEGLER TOOL CO.
1920 Twelfth Street DETROIT

Having difficulty holding
tolerances?
DEMAND THE
ZIEGLER
ROLLER DRIVE
Floating Holder
for
Taps and Reamers

AUTOMATICALLY compensates
for machine spindle misalignment,
eliminating over-sized or bell-
mouthed holes.

Helps produce unbelievable
accuracy on both new and
old equipment.

Furnished with male or female
taper, straight, threaded or
special shanks to fit any ma-
chine used for tapping or
reaming.



IT'S NEW

TANNEWITZ UNUSUAL MACHINE

(E37)

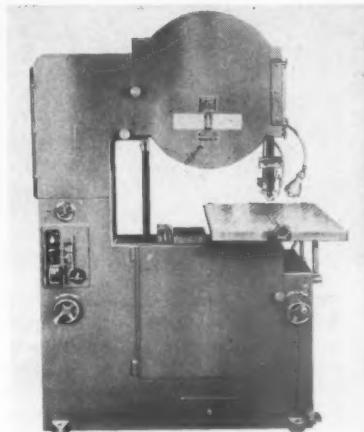
A Tannevitz Di-Saw with a 30-inch throat (distance between the column and the saw blade), although six inches larger than the standard Di-Saw, is the smallest of several machines available to meet special requirements. These saws have a 36-inch to 48-inch throat capacity and even larger sizes can be supplied. All are built along the lines of the standard No. 24 M model. These models are applicable for cutting shoes, dies, templets, filing, polishing, and nu-

merous other applications. The machine is offered by Tannevitz Works, Grand Rapids, Michigan.

IDEAL ARC WELDER

(E38)

Simplified welding is claimed as the outstanding feature of a new A.C. Electric Arc Welder just announced by the Ideal Commutator Dresser Company, 5074 Park Avenue, Sycamore, Illinois. The design includes a reactance winding on a separate core in addition to the



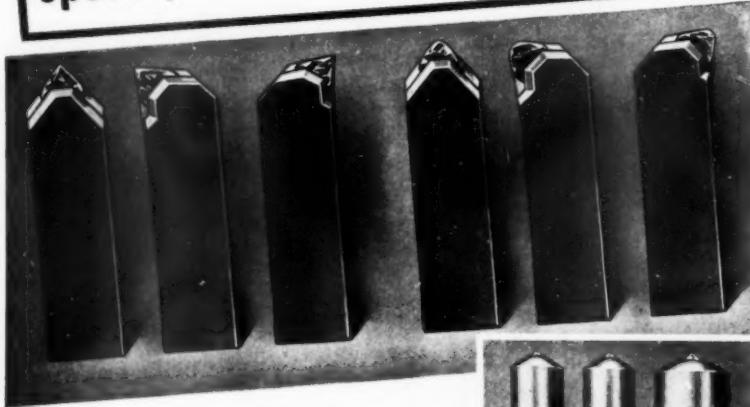
Di-Saw

Available for special requirements.

transformer. This reactance winding acts as a stabilizer, making it easy to strike an arc and hold it. As the distance between the end of the welding rod varies, this reactance winding causes the voltage to vary proportionately so that the arc is always smooth.

Fifteen different welding heats between 20 and 175 amperes give the operator accurate heat and penetration control for each individual job and different parts of the same job. Penetration may be up to $\frac{1}{4}$ " or more if desired.

Diamond tools give you faster speeds, better finish, more accuracy



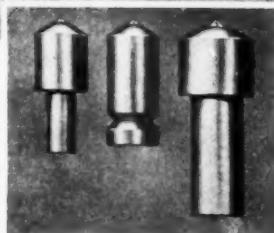
We make all types of shaped diamond tools to customers' blue prints.

Left to right—Landis Nib, Norton Nib, Cincinnati Nib.

To keep up with today's urgent demand for more, and ever more, production, many manufacturers are turning to diamond tools. They are finding, as so many other resourceful concerns have known for a long time, that diamonds can speed up a number of important operations in industry. They learn that diamond tools cut at much higher speeds than others, that they give a superior finish that often eliminates the need of subsequent grinding and polishing, and that they insure greater accuracy that reduces the proportion of rejections.

If you have more orders than you can handle, or if you are waiting for the delivery of machine tools you have ordered to increase production, it will pay you to investigate the use of diamond tools. You may find them capable of sufficient additional capacity to take care of your present requirements.

With thirty years of experience in the application of industrial diamonds, we will be glad to advise you. We carry large stocks of Bortz, Carbons, Ballas, Cleaved or Natural Points, Diamonds for Dies, Glazier's Diamonds, Phono Points, Crushing Boart, Splint, Powder, Etc. Send for illustrated folder and prices, or send blueprints for quotations of shaped tools.

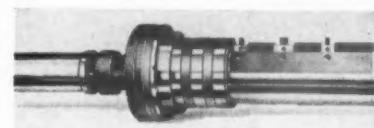


SCULLY-JONES RECESSING TOOLS

(E39)

A special line of tools for recessing, grooving, undercutting, necking, and facing is announced by Scully-Jones and Company, Chicago, Illinois. These automatic tools for production work are suitable for use on automatic screw machines, turret lathes, drill presses and horizontal boring mills.

In operation a ball bearing stop collar strikes against the work, or bushing, stopping the forward movement, while the rear portion of the tool continues in motion, feeding the tool bit into the work. Adjustment is provided for the tool bit after regrinding, for location of groove, for correct depth setting in con-



Recessing Tool
For automatic machines.

trolling the diameter of recess and also for length of recess or groove in tools where the bit moves forward after reaching the maximum diameter of its cut. Holes as small as $\frac{5}{16}$ inch in diameter can be recessed with grooves of varying widths and depths.

ANTON SMIT & CO., INC.
57th Street (near Battery), NEW YORK, N.Y., U.S.A.

for PHILLIPS SCREWS SLOTTED SCREWS CLUTCH HEAD SCREWS

Have you made the APEX MACHINE & TOOL CO. your *Source of Supply* for Power Bits and Hand Drivers for Phillips and Clutch Head screws, and for Power Bits for slotted head screws?

Here are some of the reasons why others do:

APEX Power Bits are available for practically all electric, air and spiral drivers.

APEX Power Bits are made for all sizes and types of Phillips, slotted head and Clutch Head screws.

APEX Power Bits are made of a special grade of shock-resisting tool steel, hardened and tempered to give maximum toughness and resistance to wear.

Made by men long experienced in the specialized production of Power Bits and Drivers — and experience is the greatest contributor to skill.

APEX supplies more Power Bits and Drivers to Industry than any other manufacturer.

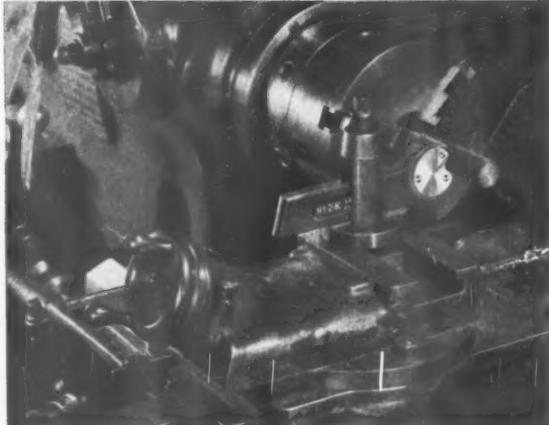
APEX Power Bits mean faster, better production.

The APEX MACHINE & TOOL CO.

1027 S. Patterson Boulevard

DAYTON, OHIO

ARMSTRONG



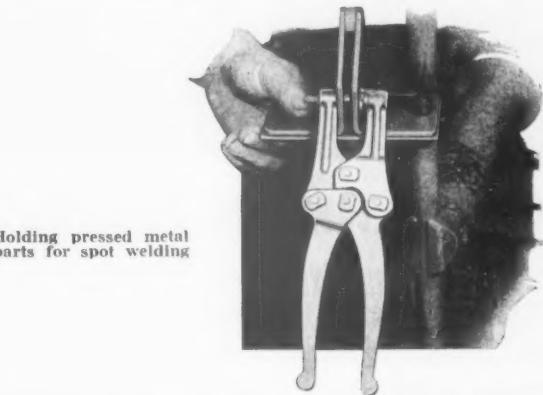
Uniform clean-cut knurling always

- Your knurling can be no better than your knurls and the tool that holds them. Standardize on ARMSTRONG Hobcut Knurls — the sharper, deep cut, accurately formed patterns. Use them in the ARMSTRONG Knurling Tool which is automatically self-centering, which automatically equalizes pressure on knurls and "tracks" accurately. Knurls are held in a large knuckle joint that has strength to withstand tremendous side and end thrust. Write for Catalog C-39.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

360 N. Francisco Avenue Chicago, U.S.A.
Eastern Warehouse & Sales: 199 Lafayette St., New York



DE-STA-CO Toggle Pliers Have Many Uses

Welding must be swift and sure; and the welding operator is entitled to the best tools that can be supplied. Here is shown a welding operation in which De-Sta-Co portable Toggle Pliers are used to hold the parts in place.

De-Sta-Co has quick-acting Toggle Pliers, or Toggle Clamps, suited to hold parts during many manufacturing operations . . . Send for Catalog No. 40, which shows photographs of clamp uses.

DETROIT STAMPING CO.
Established Over 25 years
356 Midland Ave • Detroit, Mich.

IT'S NEW

FEDERAL DIAL SNAP GAGE

(E40)

A new Federal Dial Indicator Gage is announced by Federal Products Corporation, Providence, Rhode Island. With this dial type snap gage the inspector is said to be able to see exactly how the work varies in diameter from the master or specified dimension, whereas with the "feeler" type snap gage with go and no-go contacts, the inspector could not tell exactly how far off the work was. There was always an element of doubt

as to whether one workman would force it between the contacts harder than another. Not by any means the least of the advantages of this gage is said to be its speed, for in operating feel type gages it always takes considerable time for one to feel the work as it is tested with the gage. This takes several seconds, whereas with this new gage, the inspector sees immediately the actual comparison of the work with specifications.

The gage has an adjustable lower anvil with a rounded lip for easy insertion of the work, and the upper anvil operates under an auxiliary spring tension



Dial Snap Gage
Instantaneous comparison.

so as to maintain a constant and uniform pressure at all times on the work. The backstop is also adjustable over various diameters.

PLEASE NOTE: The purpose of this department is to call to the attention of its readers new production ideas. To aid readers in getting complete technical data on any item in which they are interested a key number is given for use on the post card bound in this issue.



KNIGHT TIME IS PRODUCTION TIME

In these days of "full speed ahead," set-up time turned into production time is like money in the bank.

The ease and speed with which work can be set up on a Knight Miller increase its

production time to a maximum.

Dial indicators save preliminary layout time and eliminate jigs and fixtures. Counter-balanced spindle head and Centralized controls make for ease of operation.

KNIGHT TIME IS THE QUICKEST TIME

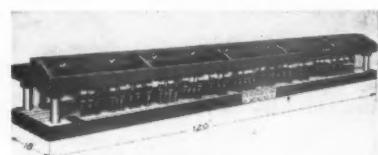
Write for NEW Catalog

W. B. Knight Machinery Co.

ST. LOUIS, MISSOURI

WHISTLER PERFORATING DIES

An unusual example of the versatility and adaptability of adjustable perforating dies is announced by S. B. Whistler and Sons, Inc., 736 Military Road, Buffalo, New York. Die shoe 18" wide by 120" long for a 10 foot power brake utilizes these dies. The important feature is said to be the tremendous saving in time and die expense to get into production and the additional time saved when actually performing on the job. In this particular application an aircraft manufacturer anticipates perforating as many as 100 holes per stroke in Duraluminum sheets used in airplane parts. The illustration shows 44 punch



Perforating Dies
Room for twice as many more.

and die units arranged along the front side only with room available for at least twice as many more. The user of these adjustable dies is said to be able to instantly rearrange perforating positions, as well as sizes and number of perforations to be made.

Send for Valuable Booklet

Forgings For All Industries
Rough Turned or Finished Complete



Composite Die
Sections
Extrusion Tools
Crankshaft Forgings
Gear Forgings
Die Casting Dies

Rings, Discs, Blocks,
Shafts, Hubs, Bars,
and Special Shapes.
Tool Steel of all
Makes
S.A.E. Specifications

STAINLESS & COPPER FORGINGS

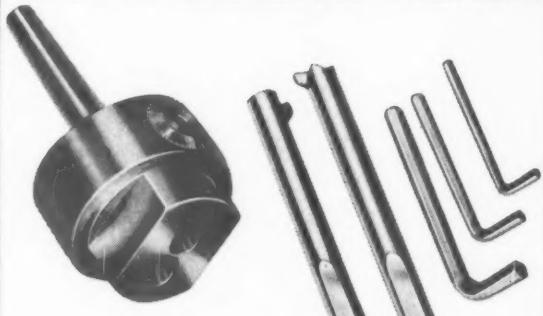
May We Serve You?

AJAX STEEL & FORGE Co.

205 ADAIR STREET

DETROIT, MICHIGAN

FRAY MICROMETER OFFSET BORING HEADS



WRITE FOR BOOKLET

FRAY
MACHINE TOOL CO.

Makers of

"ALL ANGLE"
MILLING MACHINE &
MILLING ATTACHMENTS

505 W. Windsor Road

Glendale, California

TOOL DESIGNERS



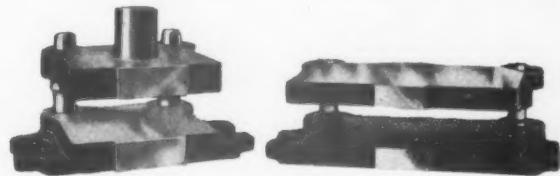
NEW—up-to-the minute catalog pre-

DIE SETS

senting easy-to-read data you need.

Get YOUR COPY Now

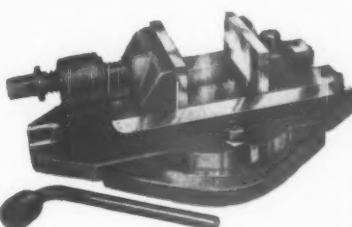
Tool and die designers will find this new catalog and data book of inestimable value. Large figures, tables, large drawings, and other features make it unusually interesting and complete. It has what you want—and it's easy to find it—you'll see when you get your copy. Write for it now.



FAST SERVICE ON PRODUCTO DIE SETS AND VISES

Complete, quick service for every part of the country. Assembly and warehouse facilities are available at Bridgeport, Detroit and Cleveland. In addition complete facilities are available at Detroit for manufacturing, assembling and shipping all Producto Cataloged and Special Die Sets. Ohio, Western Pennsylvania and West Virginia are served by the Die Supply Co., 1390 E. 30th St., Cleveland, Ohio. Pacific Coast requirements are handled by Joseph C. Fletcher, 1415 Folsom St., San Francisco, Calif., and Frey Industrial Supply Co., 3828 Santa Fe Ave., Los Angeles, Calif. Middle Western points are served by motor truck from Detroit. Producto Die Sets are available in semi-steel or steel for mounting dies, for power presses, plastic molds and die castings. Accessories include Dowel Pins, Stripper Bolts, Bolster Plates, Torch Cutting and Welding Steel Plate.

Producto Vises are available for both heavy duty and general purpose milling and drilling. Full details on request.



THE PRODUCTO MACHINE CO. BRIDGEPORT, CONN.

and

3017 Medbury Ave.
DETROIT, MICH.



DISTRIBUTORS OF DICKERMAN AUTOMATIC PRESS FEEDS

IT'S NEW

AMES
HUNDRED SERIES
DIAL INDICATORS

(E42)

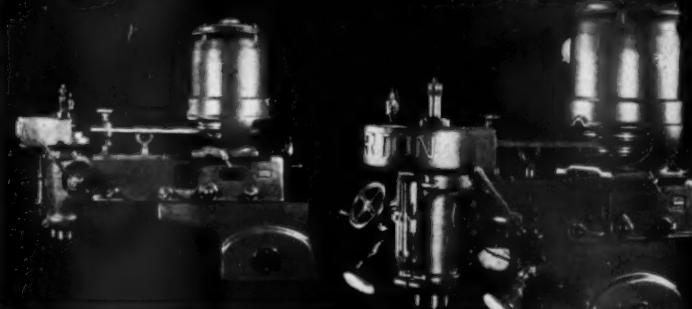
An entirely new series of dial indicators is announced by B. C. Ames Company, Waltham, Massachusetts. New indicators in the four sizes with choice of fourteen different dial numberings indicating tenths of thousandths, half-thousandths and thousandths of the inch or thousandths and hundredths of millimeters are offered in a new series of indicators which comply with the di-

mensions and characteristics adopted by the American Gage Design Committee. Jeweled indicators have jewel bearings for every staff, including the center pinion. Choice of jeweled or plain bearings in all models.

Shockless wheel assembly that protects the movements from damage by hard usage can be had in place of the regular wheel assembly if desired.

Hands start at 9 o'clock position, make 2½ turns around the dial and stop at 3 o'clock position. The range of each indicator is thereby determined according to the number of dial graduations.

UP to 12"
Extra Range
IN 30 SECONDS



View above of Head extended

The cross range of a Gorton Super Speed Miller is more than doubled — in half a minute — through the exclusive ram movement of the spindle head. By unclamping, the head may be extended as far as 12 inches.

This one feature saves floor space, set-up time, and gives you the capacity of a larger machine . . . at small machine cost.

* For full information on this and other cost saving features, write for Bulletin 1400-A today.

GEORGE GORTON MACHINE CO.

1322 RACINE STREET, RACINE, WISCONSIN, U. S. A.



DALZEN
THREAD GRINDER

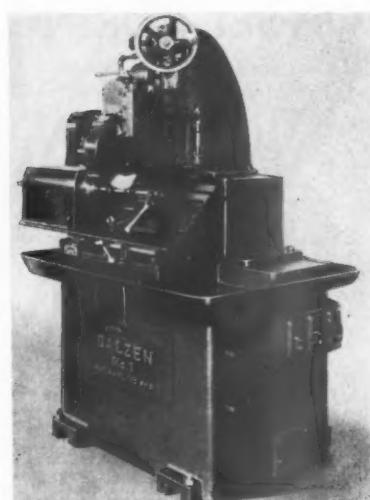
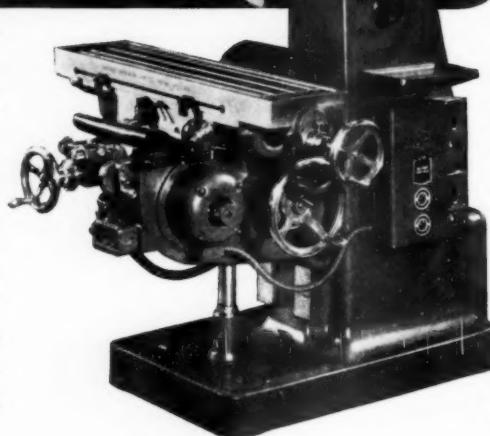
(E43)

A vertical thread grinder has just been offered by the Dalzen Tool & Manufacturing Company, Detroit, Michigan. It marks a departure from the conven-



Dial Indicator
Meets AGD specifications.

tional design of thread grinders. Instead of approaching the work from the side, the wheel does it from above. In this position the head is directly over its own base and a constant equilibrium is maintained. The weight is always down on the feed screw and a natural condition for maintaining size of work is said to be insured.



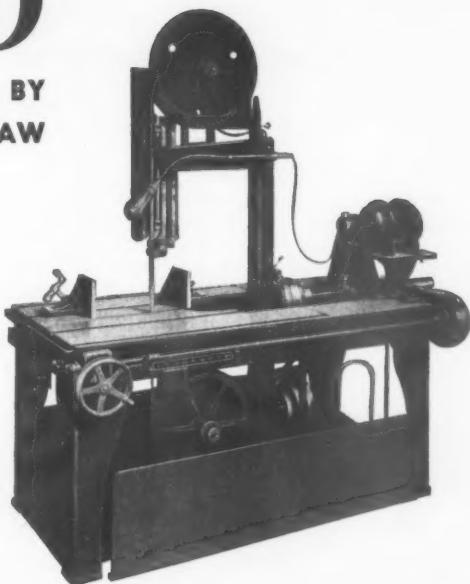
Thread Grinder
Constant equilibrium results.

Being in an upright position the Dalzen conserves floor space. It has a capacity of 18 inches between centers, 6 inches in diameter, and can produce 10-inch length threads any place on the 18-inch shaft, right or left hand, with the same lead screw.

SPEED

DIE AND JIG PRODUCTION BY
ROUGHING-OUT WITH THIS SAW

You can save tedious hours of machining, can save valuable hours of machine tool time for finishing work by roughing out, cutting to size or to shape, squaring up, or cutting-off dies, die shoes, or pieces, die-plates, and parts on this versatile large capacity metal cutting band saw. It does "a hundred tool room jobs" and does all of them well.



MARVEL No. 8
Metal-cutting Band
Saw, Capacity
18" x 18"

The most versatile saw built. Does cutting-off, notching, mitering, indexing. Blade feeds into work at any angle from 45° right to 45° left. Has large planer type T-slot bed, dual hand and/or power feed.

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave. Chicago, U. S. A.
Buy from your local distributor.
Eastern Sales Office: 199 Lafayette St., New York

MARVEL SAWs

GAMMONS
OF
Manchester



PRODUCTION TOOLS
ORIGINATORS AND
MANUFACTURERS OF HELICAL
FLUTED TAPER PIN REAMERS

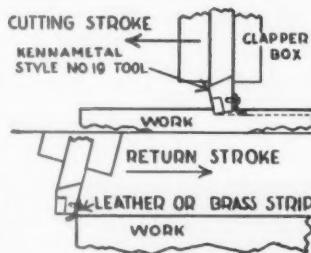
THE GAMMONS-HOLMAN CO., MANCHESTER, CONNECTICUT

MAY, 1941

KENNAMETAL
"TIPS" FOR MACHINISTS

HOW TO AVOID BUMPING TOOL EDGE ON RETURN STROKE IN PLANING OPERATIONS

If your planer is not equipped with a head which automatically lifts the tool on the return stroke, you can avoid chipping the carbide tip by bolting a strip of brass or leather to the underside of the tool (see illustration). When the tool rides back, the brass or leather strip pushes the tool up and away from the work, preventing damage to the tool tip.



This is the second of a series of advertisements describing how to get the most effective use from carbide-tipped tools. We will welcome your suggestions—whether or not you use KENNAMETAL. Please enclose drawing (or sketches) whenever possible.

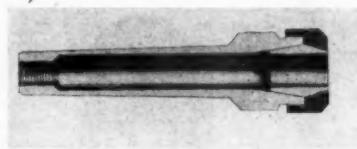
MCKENNA METALS Co.
600 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

IT'S NEW

UNIVERSAL
NEW NUT DESIGN

(E44)

An additional improvement to their line of collet chucks is announced by the Universal Engineering Company, Frankenmuth, Michigan. A new type nut in the three larger collet chuck sizes is said to reduce locking effort by 50%. Whereas the former nut construction tightened directly against the collet the new design tightens against a floating sleeve. This new method greatly reduces friction.



tion and is said to make locking easier and more positive. The outward appearance of the nut is also changed. It now is jet black, rust-proof, and fluted for tightening with a Spanner wrench.



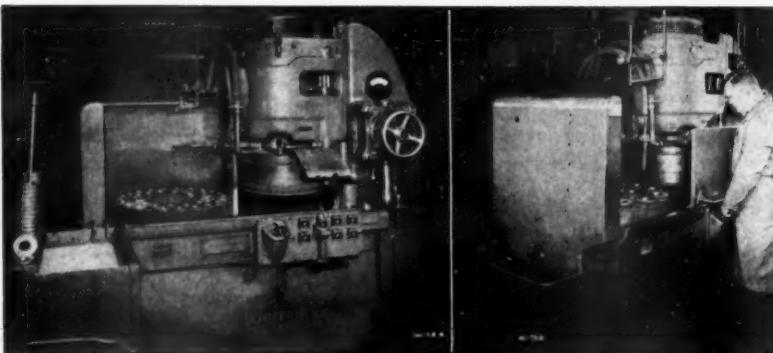
WITH BLANCHARD SURFACE GRINDERS

The largest manufacturer of automobiles in the world keeps transmission gears moving down the line by using Blanchard No. 18 Surface Grinders for grinding the gear faces. These machines not only assure maximum production, but easily give the accuracy necessary (parallel within .0005") for subsequent operations. Both faces of several

size gears are ground on Blanchard No. 18 Grinders, .020" of stock being removed from each surface. Production on the 3½" gear is 250 (500 surfaces) per hour—and changing from one size gear to another involves practically no down time. Blanchard production estimates are yours without obligation—just send samples or blueprints to



THE BLANCHARD MACHINE CO.
64 STATE ST., CAMBRIDGE, MASS.



TIMKEN
BEARING FIT

(E45)

A novel method has been developed for heating bearing cones preparatory to assembling them on shafts where a tight press fit is required.

This device consists of three trays about 4' square, approximately 12" above each other. The middle tray is of



pyrex glass while the top and bottom trays each carry seven 250-Watt special infra-red ray bulbs. The reflectors on these special bulbs are gold-plated.

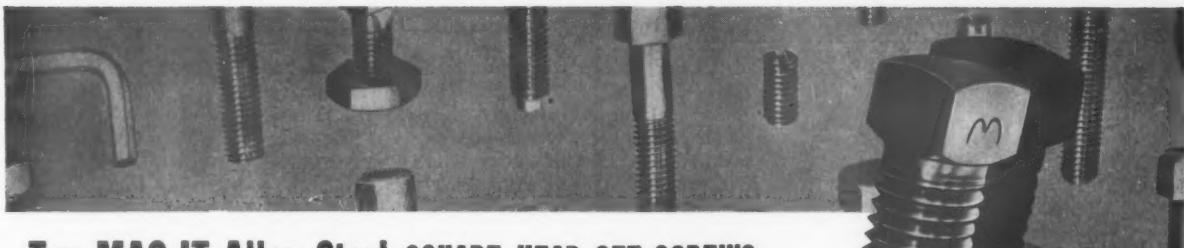
Bearing cones are not taken out of the boxes, but are stacked in their containers. About 20 minutes are required to heat a bearing up to a maximum of 155° F. The infra-red rays penetrate the boxes, heat the steel, but leave the cardboard relatively cold.

When this method of heating is used, it is not necessary to wash off the protective coating which is put on the bearings at the time of packing.

D. A. SMITH
PRESTO-VISE

(E49)

A vise for rapid clamping in production work is offered by D. A. Smith & Co., 8097 Livernois, Detroit. This vise has an overriding ball clutch and toggle clamping mechanism which are simple in construction and positive in action. To operate the sliding jaw of the vise is moved up to the work with the toggle lever in a raised position. The lever is then pressed downward against the stop to exert the pressure on the part being clamped. The amount of pressure exerted is adjustable.

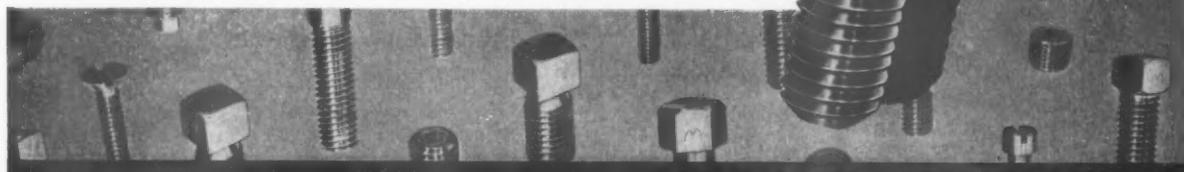


Try MAC-IT Alloy Steel SQUARE HEAD SET SCREWS

Here's three times the gripping power of the same diameter hollow set screw! Where machines take terrific punishment, Mac-it square head sets are used because they offer amazing resistance to upsetting of the points and breakage. It's Mac-its for tough jobs.

The Mac-it line gives you 16 standard items, including hollow set screws, socket head cap screws and stripper bolts—all milled from solid bars of Mac-it special alloy steel and heat treated for their particular kind of job.

Write for your copy of the new, revised Mac-it Catalog. Get full details on the only complete line of heat treated, alloy steel screws!



THE STRONG, CARLISLE & HAMMOND COMPANY
1392 West Third St., Cleveland · Ohio

SELLERS TOOL GRINDER

For Keeping
Production
At Peak



No. 4T

For tools or
tool bits from
 $\frac{1}{4}$ " square up
to $1\frac{1}{2}$ " x 2".
A fully uni-
versal grinder
for single point
Lathe, Planer,
Shaper and
Boring Mill
tools, either
high speed
or tungsten
carbide tipped
tools or tool
bits.

WILLIAM SELLERS & CO., INC.
1626 Hamilton St., Philadelphia, Pa.

Write for
descriptive
bulletin
and prices

SELLERS
1626

Sellers

MAY, 1941

**NEW TWO-PIECE NUT REDUCES
LOCKING EFFORT BY 50%**

(Right) Cross sec-
tion of new Uni-
versal collet chuck
showing floating
collar that makes
locking easy. Avail-
able in the 3 larger
sizes — Z, ZZ, and
XZ. ➤



Universal standard
collet chucks have
ground threads, am-
ple room for tool feed
out and are ideal for
holding end mills,
keyway cutters,
drills, etc. Nut fluted
for Spanner wrench.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

IT'S NEW

**FAUVER
CHAIN LUBRICATOR**

An automatic conveyor chain lubricator is offered by the J. N. Fauver Co., Detroit, which is said to solve the problem of lubricating the chain links of conveyors passing through ovens, kilns, and other hot zones. In a typical case the chain of a 250-ft. conveyor, designed to travel at the rate of two feet per minute through a firing kiln, frequently froze when passing over driving and idling sprockets, resulting in changing speed of chain travel and uneven firing

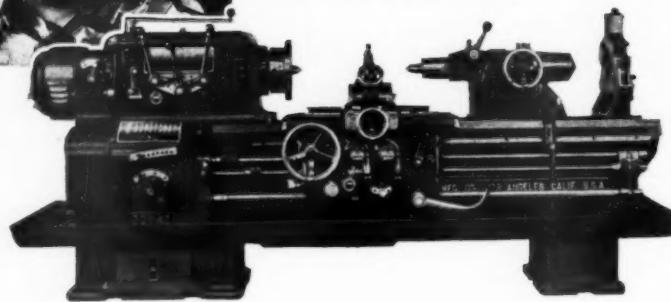
(E46)

of the ceramic products passing through the kiln.

The Fauver Lubricator consists of a two gallon capacity tank hooked up with the plant air line, with an air regulator set at 80 pounds pressure to insure effective control and operation of the outfit. The air, passing through the lubricator, picks up a predetermined and adjustable amount of lubricant and delivers it, in the form of an oil fog, to both sides of the chain links. Acheson-Colloidal Graphite is used as the lubricating agent, and its application is so controlled as to insure each chain pin be-



**O'Malley claims it is
the finest lathe he
has ever used.**



Above is illustrated the front view of an Axelson 20" heavy duty Lathe. Only Axelson Lathes offer the 24-speed headstock and the 2-speed tailstock.

DISTRIBUTORS

The Brown Tool Company, Cleveland • Griffin & Ross Machinery Co., Los Angeles • G. H. Lynn, Direct Factory Representative, Washington, D. C. • Albert Hepworth, Philadelphia • B. C. MacDonald & Co., St. Louis • McArdle Equipment Co., Houston • Osborne Machinery Co., San Francisco • Edward W. Voss, Dormont, Pittsburgh • Wilson & Brown, Inc., New York City • Winterhoff Machinery Co., Detroit • H. F. Wolnick Machinery Co., Chicago • Earl E. Wright, Chattanooga

"Yes sir, as soon as I put my hands on this baby I knew I had something. She has a feel that means business. When I chuck a casting or a chunk of steel in this Axelson I'm ready to go places. See how she bites into the rough cuts like slicing cheese. Then I change the tool and start the fancy work. I used to rough my jobs in one lathe and finish them in another. That blew up time on my job ticket. Now I start and finish at one setting. I don't do any of this plus or minus business, either. I always hit it smack on the head by what the B/P says. And I've done things on this Axelson that I never could do on any other lathe. That makes the boys up in the front happy. They think I'm a whole machine shop. When I get through, the inspectors have nothing to reject. Take a tip—if you're looking for a he-man lathe that has a lady finger touch, get an Axelson, in any swing or length."

AXELSON MANUFACTURING COMPANY

6160 South Boyle Avenue, Los Angeles, California (P. O. Box 98, Vernon Station)
50 Church Street, New York • 3844 Walsh Street, St. Louis

WRITE TODAY for
your copies of these
brand new Axelson
circulars.



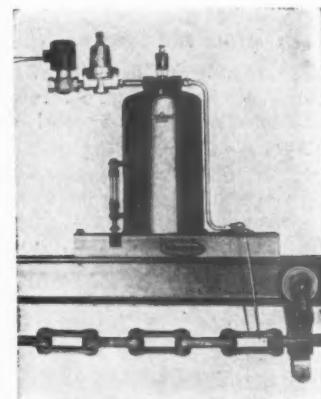
IT'S NEW

ing lubricated for its entire length every trip and still leave no excess to cause drip. The action is entirely automatic.

**GIVEN
VARI-SPEED DRIVE**

(E47)

A new motor drive is announced by the Given Machinery Company, Los Angeles, California. This Vari-Speed Motor Drive is said to provide positive,



**Chain Lubricator
The links are in a fog.**

infinitely variable speeds within its ratio of 4 to 1. It permits instant regulation of spindle or cutting speeds to a fraction of a revolution per minute. A 16" 3-step double back geared lathe can be operated at from 20 to 710 rpm. with an instantaneous choice of any speed with-



**Vari-Speed Drive
Belt shifting is eliminated.**

in these limits, according to the manufacturer.

A large diameter single take-off pulley eliminates all belt shifting. Convenient hand wheel changes speed while in operation. The drive has a one piece frame and low center of gravity. The pulleys are dynamically balanced with ground belt surfaces. Oversize sealed ball bearings throughout the unit. It is supplied in sizes from 1 to 5 H.P.

**SPEED WITH
LONG DIE LIFE**

use these small size
NIAGARA INCLINABLE PRESSES



NIAGARA

NIAGARA MACHINE & TOOL WORKS, BUFFALO, N.Y.

**MORE SPEED
LONGER LIFE**
with PUTNAM END MILLS



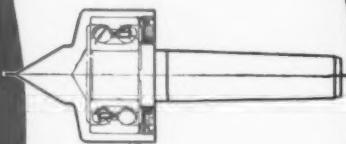
In an operation such as that illustrated—milling $\frac{1}{8}$ " slots in a die block—Putnam End Mills permit the maximum speed and feed. In addition, manufacturing and heat treating methods assure long, trouble-free service. Why not prove to your own satisfaction—by actual use on your machines—that the end mills which do "cut faster and last longer" are produced by Putnam?

PUTNAM TOOL COMPANY
2987 Charlevoix Ave. • Detroit, Michigan

MAY, 1941

**RED-E
NEW DEPARTURE
BALL BEARING
CENTER**

POINTS
RUN
TRUE
AND
STAY TRUE
AT ALL
SPEEDS



Always dependable
for accuracy and
rigidity. Exceptional
results obtained due to
the double row angular
contact preloaded
ball bearings and the
ground-after-assembly
point.

THE READY TOOL Co.
585 Iranistan Ave.
BRIDGEPORT CONN.

Write for
Catalog
E-41

STANLEY
"FLUD-LITE" SHIELD

(E48)

A new "Flud-Lite" Eye Shield suitable for use in all grinders, belt or motor driven, is announced by Stanley Electric Tool Division, New Britain, Conn. Fitted with two bayonet type light bulbs it throws light directly on grinding wheel and work. The design and lighting arrangement provides 30% more visibility for the operator than previous shades, according to the maker. The Eye Shield is adjustable up or down and

can be arranged to suit the operator's position. It cannot, however, be moved to a non-guarding position without dismantling. The use of Eye Shields on a grinder assures the protection of the operator's eyes from particles thrown from the wheel. They are more sanitary than goggles, and being attached to the Grinder, must be used.

Frame is a die casting, aluminum finish and holds two sheets of glass 4" x 6", one piece of safety glass with ordinary window glass beneath, which is easily replaced if it becomes pitted with emery dust.



"Flud-Lite" Eye Shield
More sanitary than goggles.

END VIEW OF HEXAGON DRIVE

GAIRING
Type A Counterbores

These simple, powerfully constructed, short shank counterbores rate high in cutting efficiency. Holders, of Morse Taper design, come in five sizes taking cutters from 1-4" to 5" in dia. Complete assemblies, holders, cutters and pilots are carried in stock. Larger sizes made up quickly.

A trial will convince you that Type A, due to its low cost, is particularly desirable for production counterboring and spot facing.

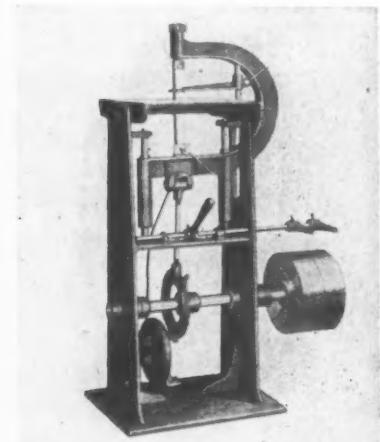
The Gairing Tool Co., Detroit, Michigan
In Canada, Hi-Speed Tools Ltd., Galt, Ont.

SPECIALISTS IN FINE CUTTING TOOLS FOR 24 YEARS

[The Type A Counterbore illustrated in the above advertisement is described in great detail on pages 4 and 5 of Gairing Catalogue No. 40. For complete information, please turn to those pages.]

Early Die-Cutting Technique

An interesting example of early die-cutting technique is explained in an old catalog dug up from the files of the Henry G. Thompson & Son Company, New Haven, Connecticut. In a letter dated April 21, 1896, George M. Griswold, a New Haven toolmaker, writes: "It gives me pleasure to report the first trial of your jig saw on die work, viz: I had two blanking dies to make the same size, one right and one left hand.



Die-Cutting in 1896
Electric welding stood in the way.

I gave one to my die-maker to drill, chip and file out, which took him six hours. I sawed out the other on your jig saw; time one and three-quarters hours."

The stock was $\frac{1}{2}$ " tool steel. The saw was coiled in a 50' magazine at the base of the machine and could be drawn through as required.

Although metal-cutting band saws were in use at that early date, this jig saw was the true forerunner of the modern profile sawing machine in that it was able to saw to a curved line. Electric welding of very narrow, metal-cutting band saw on the machine was apparently all that stood in the way of present widespread use of Profile saws.



'14 TO '41

World war! Depression! Boom days! Depression!
Readjustment! Recession! . . . and now DEFENSE
PRESSURE!

Since Eclipse started in business 27 years ago manufacturers have faced all these business conditions. But whether the problem has been getting the most out of every dollar—or the greatest volume irrespective of costs, wise shop men have "DRAFTED" Eclipse Tools!



ECLIPSE COUNTERBORE CO. DETROIT • MICHIGAN



VINCO Angle Tangent To Radius DRESSER



The Only Abrasive Wheel Dresser Offering All These Advantages

- ★ Provides the only fast, accurate method of meeting every forming requirement in dressing operations.
- ★ Incorporates the basic patented principle of dressing radii, angles and angles tangent to radii on abrasive wheels from the same axis without moving the diamond.
- ★ Can be used on your surface, external, cutter and internal grinders.
- ★ You can count on dressing accuracy to within .0001" and savings of approximately 75% in dressing costs.

WRITE FOR FULL INFORMATION

VINCO Corporation

9115 SCHAEFER HIGHWAY DETROIT, MICHIGAN

SPEED

Plus Micrometer Accuracy!

A leading manufacturer puts a Haskins Type C Tapper to work tapping the 40-pitch thread in the frame of his micrometers. What happens? Not only are these most exacting of precision standards being met, but production is actually doubled!

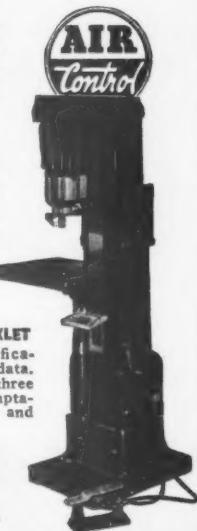
With this air-controlled tapper on the job, Class 3 and 4 fit—and high production schedules—can be consistently maintained. If you want both speed and precision—if you want lower tapping costs and faster tapping production—get all the facts on the Haskins Type C Tapper.

WRITE FOR FREE BOOKLET giving complete specifications and performance data. Type C is available in three capacities and easily adaptable to magazine, dial and hopper feed operations.



R. C. HASKINS CO.

2756 W. Flournoy St., Chicago



New Literature

Of Interest to the Tool Engineer

Turret Lathe

Turret Lathe Tools. 168 pp. Gisholt Machine Company, 1229 East Washington Avenue, Madison, Wisconsin. The complete line of Gisholt Turret Lathe Tools for use on ram and saddle types of turret lathes is described and illustrated in this loose leaf catalog. One hundred sixty-four tools (many of them not previously announced), built in

more than 500 sizes, are completely illustrated in three colors and short easy-to-read descriptions of each are given. Dimension drawings are large enough to permit direct scaling to layout sheets. Copies of the catalog will be supplied only to those writing directly to the publisher. Turret lathe users can secure the catalog at no cost by writing on company letterhead listing the make

and model of machine used and the writer's title or occupation. All others, including students and teachers, can secure a copy by accompanying their request with a remittance of \$2.50.

(179) Slide Selector

Selector of Physical Properties. Ampco Metal, Inc., Milwaukee, Wisconsin. This cardboard slide selector may be used for quickly ascertaining the physical properties and chemical composition of all grades of Ampco Metal. The reverse of the selector contains a table listing the general uses of the alloy by grades.

(180) Riveting Machine

Automatic Riveting Machines for Airplane Manufacturers. 16 pp. Chicago Rivet & Machine Company, 1853 South 54th Avenue, Chicago, Illinois. Four models of this company's new line of automatic riveting machines, both bench and pedestal types, especially designed for setting aircraft rivets are illustrated and described in this brochure. The line is completely automatic, feeding, inserting and upsetting the rivets at a single machine stroke.

(181) Contour Saws

The World's Fastest Precision Method of Removing Metal. Continental Machines, Inc., 1304 South Washington Avenue, Minneapolis, Minnesota. This spiral bound brochure is directed especially to trade and vocational schools, training centers, and N.Y.A. headquarters. It contains specification sheets on the various machines manufactured by this company, illustrations of the equipment and letters from users.

HOW TO ORDER

Booklets listed in these pages or information on new equipment may be obtained by using the post card bound in this issue. Merely fill out one coupon for each item desired, being sure to print plainly and to include position and company. Mail the card to us and you will receive the information desired at once.

(182) Hob Sharpening

Right and Wrong of Hob Sharpening. 28 pp. Illinois Tool Works, Chicago, Illinois. This booklet is well illustrated with line drawings, and gives detailed information upon the proper method of hob sharpening, and the types of errors likely to be encountered.

(183) Limit Gages

Adjustable Limit Snap Gages. 8 pp. Pratt & Whitney, Division Niles-Bement-Pond Company, West Hartford, Connecticut. This folder illustrates and describes this company's line of adjustable limit snap gages, both Trusform and AGD. Of particular interest is the new Electrolimit Snap Gage.



What it IS...
What it DOES

Other Advantages of Built-In Air Cushion

- Eliminates Damaging Metal-to-Metal Impact, Noise, Shock and Vibration
- Prolongs Cylinder Life — Reduces Wear on Piston and Cup Liners.
- Cuts Maintenance Costs.
- Provides Cushioned Air Cylinders in Non-Cushioned Price Range.
- Assures Smooth, Quiet, Efficient Operation at Low Cost.

There are 3 types of NOPAK Air Cylinders, (a) Self-Regulating Cushion (b) Adjustable Cushion and (c) Non-Cushioned. Each available in 6 standard mountings.

The NOPAK Self-Regulating Cushioned Air Cylinder is one cylinder which requires no adjustment. The cushioning action at the end of each piston stroke is controlled automatically. As the piston sleeve enters the bore in the cylinder head, the air trapped between piston and cylinder head acts as an air-cushion over the entire piston surface.

"Cushion" Remains Constant

The smooth, gradual, cushioning action (pre-determined by the taper, tolerances and length of cushion-sleeve, and by exhaust-bore diameter) remains constant at all times regardless of stroke length or cylinder bore. There is no needle-valve to be frequently re-adjusted, to clog up, get out of order.

For Complete Data, ask for Bulletin 77

GALLAND-HENNING MFG. CO.
2757 South 31st Street • Milwaukee, Wis.
Representatives in Principal Cities

NOPAK
VALVES and CYLINDERS
DESIGNED for AIR or HYDRAULIC SERVICE

A 3116-1/2



QUICK - A SPECIALIST!

MILFORD PROFILE SAW is made by a specialist in metal-cutting saw for use on all contour sawing, jig and band saw machines. Its ability to cut more metal faster proves Milford's experience of more than half a century.

For years Milford Profile Saw was largely sold under the private brands of machine manufacturers. Now you can obtain it "right around the corner" at your Mill Supply House where a complete range of sizes, tempers, tooth styles, etc., is in stock ready for delivery by special messenger if necessary.

A machine for contour sawing is no better than its saw. Milford Profile Saw is made by the world's largest, most experienced manufacturer of metal-cutting band saw.

*Write for free sample, giving specifications of blade you now use, and make of machine.

THE HENRY G. THOMPSON & SON CO. NEW HAVEN, CONN.

MILFORD

PROFILE SAW — REZISTOR HACKSAW BLADES

"LONGER TOOL LIFE" Begins in the Tool Room

Your Drills, Cutters, Face Mills, Tool Bits, Taps must be properly ground if you expect to obtain **longer tool life**.

OLIVER OF ADRIAN CAN PROVIDE the best method for sharpening your cutting tools. Precision, accuracy, lower tool cost, more work between grinds are assured by the Oliver method.

Leaders in every "DEFENSE INDUSTRY" find Oliver equipment of real help in maintaining their production schedules.

Send for literature **today** and learn how others are getting "Longer Tool Life."

Drill Grinders, Face Mill Grinders, ACE Tool Grinders, Tap Grinders, Template Tool Bit Grinders, Point Thinners, Die Making Machines.

OLIVER INSTRUMENT COMPANY
1440 Maumee St.
Adrian, Michigan

WORLD'S GREATEST all around
ELECTRIC TOOL

DRILLS • GRINDS • SANDS
SAWS • POLISHES
SHARPENS • CARVES



ONLY
\$7.95
POSTPAID
GUARANTEED
FOR ONE YEAR

The new **WHIZ ELECTRIC TOOL** is the handiest power tool ever made. A rugged tool for power and precision work. Drills thru $\frac{1}{4}$ inch iron plate in 42 seconds or engraves intricate designs. Handles any material: Metals — Woods — Alloys — Plastics — Glass — Steel — etc. Saves time. Eliminates labor. Plug into any socket AC or DC. 110 volts. Chuck $\frac{1}{4}$ inch capacity. Ball bearing thrust. Powerful, triple-gearred motor. STANDARD MODEL with Normal Speed (uses 200 different accessories instantly interchangeable). Price only \$7.95.

The only **DRILL-TOOL** with a full year's guarantee.

FREE Accessory outfit (Value \$2) includes set of drills, mounted $1\frac{1}{2}$ inch grinder, sanding discs, cutting wheels, mounted brush, polishing wheel, carving burr, etc. FREE with each Tool ordered NOW. We pay postage.

10-DAY TRIAL—MONEY BACK GUARANTEE

PARAMOUNT PRODUCTS CO.
Dept. 5 TEN 545 Fifth Ave. New York, N. Y.

NEW LITERATURE

(184) **Measuring Machine**

Standard Measuring Machine. 16 pp. Pratt & Whitney, Division Niles-Bement-Pond Company, West Hartford, Connecticut. This folder illustrates, describes and gives the specification for the latest model measuring machine. The circular also includes the Pratt & Whitney Electrolimit Universal Internal Comparator and the company's lead tester.

(185) **Portable Electric Tools**

Skilsaw Portable Electric Tools. 60 pp. Skilsaw, Inc., 5051 Elston Avenue, Chicago, Illinois. This catalog illus-

trates and describes the Skilsaw line of drills, belt sanders, grinders, disc sanders, blowers, bench grinders, and floor sanders.

(186) **Cutting Tools**

Kennametal Steel and Metal Cutting Tools and Blanks. 32 pp. McKenna Metals Co., 600 Lloyd Avenue, Latrobe, Pennsylvania. This catalog lists specifications and prices for five styles of blanks, twenty-eight standard tools, and several semi-standard tools; as well as for lathe and grinder centers supplies with Kennametal nibs.

(187) **Boring Machine**

Ex-Cell-O Precision Boring Machine. 20 pp. Ex-Cell-O Corporation, 1204 Oakman Boulevard, Detroit, Michigan. This series of five four page folders illustrates, describes, and gives the general specifications for the five standard Ex-Cell-O machines for boring, turning, facing, and similar operations.

(188) **Drill Grinder**

Black Diamond Drill Grinders. 4 pp. Black Diamond Saw & Machine Works, Inc., Natick, Massachusetts. This folder describes and illustrates typical operations of this company's line of precision drill grinders.

(189) **Diecasting**

G & N Presents. G & N Manufacturing Company, Cleveland, Ohio. This catalog contains complete photo-diagrams and specifications on G & N diecasting machines. Included is a new three-page unfold, showing the combination machine for zinc-tin-lead and aluminum-brass-magnesium applications.

(190) **Pneumatic Tools**

Thor Catalog. 64 pp. Independent Pneumatic Tool Company, 280 S. Jefferson St., Chicago, Ill. This complete new catalog illustrates, describes, and gives the specifications for the Thor line of rock drills, paving breakers, clay diggers, sump pumps, and associated air tools.

(191) **Burs and Cutters**

Grobet Burs Catalog. Grobet File Corp. of America, New York City. This catalog shows the complete line of small Grobet burs or cutters with $\frac{1}{8}$ " and $\frac{3}{32}$ " shanks, suitable for use with small electric hand drills and flexible shaft machines.

(192) **Lathes**

Heavy Duty Lathes. Six new bulletins. Axelson Manufacturing Company, Box 98, Vernon Station, Los Angeles, California, Department A. These bulletins describe in detail various sizes of Axelson heavy duty 24-speed geared head lathes. Each bulletin shows both front and rear view of the lathe in large-scale illustration and gives detailed description and itemized specifications.

Apprentice Charts

Blueprint Charts on Lathe Practice. 3 charts. 10c. Atlas Press Company, 414 N. Pitcher Street, Kalamazoo, Michigan. These three charts are on "Lathe Cutting Tools", "Thread Forms and Formulas", and 60° V-Type Thread Dimensions." They measure 16 $\frac{1}{4}$ " wide by 21" high. They are available to industrial instructors and apprentice directors.

Cemented Carbide Tipped Cutting Tools are essential for the full capacity use of your machine tool equipment.

SPEED UP YOUR DEFENSE PROGRAM WORK WITH SUPER TOOLS.

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Entirely new Indicators in four sizes with choice of fourteen different dial numberings.

All dimensions and characteristics to American Gage Design Committee specifications. Choice of jeweled or plain bearings in all models. Shockless wheel assembly optional.

Described with many other models in the new Catalog No. 52.

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MORE VALUABLE THAN EVER The KEYLESS feature of ETTCO DRILL CHUCKS

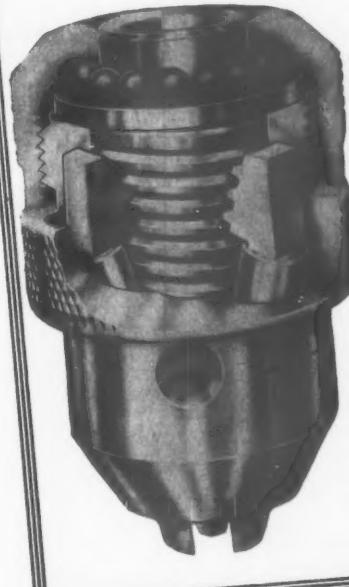
The fact that ETTCO Drill Chucks require no key is one reason why they have held their place as "Industry's Favorites" for 20 years. Today, when every minute counts, this self-tightening feature takes on first line importance because of its big time-saving possibilities.

Because there is no key to bother with, seconds are saved every time a drill is placed or replaced in every chuck. During the course of a week these seconds add up to hours. And more time is saved because ETTCO Chucks never have to be retightened. Drilling action tightens their grip and the heavier the load, the tighter they hold. Yet a twist of the knurled body by hand instantly releases the grip.

In addition to this important keyless feature you get in the improved ETTCO Chucks, a quality of construction that assures long, trouble-free service. A trial will prove to you that ETTCO Chucks give you everything you want and need in a drill chuck.

**FULL DETAILS AND PRICES
IN BULLETIN No. 6**

Write for a copy today.



This cut-away view shows the rugged proportions of all parts—all of which including body, are hardened . . . Actuating screw and jaws are now made of nickel-steel for utmost strength and wear . . . Note the actuating screw only moves jaws up and down—it takes no torsional strain—a big reason for the success of this chuck . . . Note also that the jaws are keyed which keeps them always in correct gripping position—drills are accurately centered every time.

• • •
Etco Keyless Chucks are also stocked to fit all electric drills.

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586 Johnson Ave., Brooklyn, N. Y.
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The Famous
Etco-Emrick DRILL CHUCKS • TAP HOLDING CHUCKS
TAPPING ATTACHMENTS • TAPPING MACHINES
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS
Unexcelled for Design, Materials and Workmanship

Handy Andy Says —



WELL, I'm back again, like the bad penny, without even the leave of absence that makes the heart grow fonder. And don't ask me why; it's just one of those things. But, if you must know, I met a few friends during Show week, so I figured that

maybe you boys would put up with me a while longer. Then, too, it's possible that I harked to the dulcet song of the siren, and where the fair sex is concerned it's just a case of unconditional surrender. And finally, Jens Feldborg told me that, whenever he comes home late, his wife reads him Handy Andy as a bedtime story. (As punishment or a lullaby, Jens?) Anyway, that's my story and I'll stick to it.

If anyone sees L. C. Tingley of Federal Products and Bill Ormondroyd of Taft-Peirce please tell 'em I'll answer their letters of several years standing

when I get time. Later correspondence isn't due for answer yet. Thank you.

Famous sayings: "Ven Ay coom to das country Ay couldn't say enyineer, but now, by Yiminy, aye am one". King Cole.

One of the things that has puzzled me is what to do with Past Presidents, outside of lining 'em up at the Speakers-table at the annual banquets. But, during the Show dinner at the Book, I met George Keller thunderclouding down the aisle a/c a waitress straightened up all the chairs he had tipped up, in anticipation of herding all his Buffaloes into one corral. Now, they don't call me Handy Andy for nothing, and right away I steered Geo. K. over to George Washington (Joe) Siegel, and Joe just fixed him up pronto, everybody happy. Which reminds me that "I'd rather be right than President", don't care who is President "as long as I can write the songs." But Joe beat me to that; he not only was Prex but wrote the song as well. You know, we've had some pretty fine men in the Chair, and I have no favorites; they all made me work, and even Frank Curtis won't give me a rest — yet. Somehow, though, I hated to see d'Arcambal lay down the gavel. d'Arc's a swell guy, and did a swell job. But then, he built on a good foundation.

SPEED CASE STEEL

A LOW CARBON OPEN HEARTH PRODUCT

Assures You...

1. CARBURIZING

Direct quench or complete treatment gives comparable results with SAE X1020 or X1314 — Hardness of case Rockwell C61+, Tough ductile core.

2. PHYSICAL PROPERTIES

Equal to SAE X1020-X1315-1115

3. UNUSUAL DUCTILITY

180° Bend (Cold Drawn - 1" Rd)

4. SMALLER INVENTORY

Due to Versatility of Speed Case

5. INCREASED PRODUCTION

40% to 80% Over SAE X1020-X1314, etc.

6. MACHINABILITY

Machines as fast as SAE X1112

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Reduce Your Inventory
SPEED CASE
the ALL PURPOSE Steel
will allow you to reduce
the number of different
steels you are now
carrying in your stock.
ASK US FOR DETAILS

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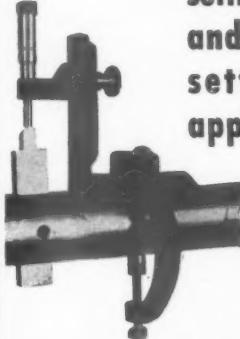
MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

You know, it's getting to be so that being elected Prex of the A.S.T.E. is like an appointment as ambassador to St. James; it's not the initial outlay so much as the upkeep. Which may be construed as an indirect tribute to Pratt & Whitney, Westinghouse, Ford and Chrysler Motors, Pioneer and Van Norman that have so splendidly encouraged the Society and its executive officers. Thanks a lot! ???? Let's see now, what's next? You see, I'm still wool gathering a/c that screwball Tool Engineer (?) that d'Arc rung in on us at the dinner. You know who I mean; the guy that tore up the speakers' notes and even got the speaker of the evening talking in circles. At that, it takes genius to rattle the F.B.I. Oh yes, I was going to say! Met a swell looking chap at the dinner, just exuded friendliness and personality, and of course I knew him but what the heck was his name, now? I thought of everything, using my infallible(?) system. Something hard, like Stone, Steel, Irons? Nope. Nature, then; Waters, Maples, Oakes? Warm, but not hot. Finally I asked, and you know, I was on the right track all the time. Clif Ives, from Chicago! It's really a wonderful system.

Well, the boys in the back room

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... use a
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For speedy, accurate setting of boring tools, and many other tool setting and related applications.

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LOW COST INDEXING**

**HARTFORD
SUPER-SPACER**

This flexible device for speeding indexing on a variety of operations—milling, drilling, slotting, planing—should be in your shop. Produces maximum production at minimum cost from present machine tools.

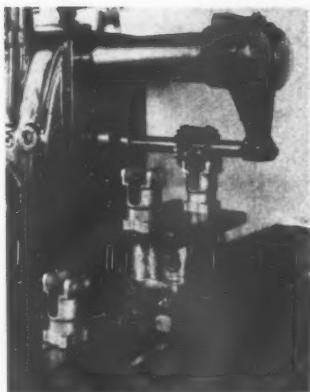


Illustration shows Hartford milling 3 surfaces in tough alloy castings. Operator loads one piece while another is being machined. Vertical feed used. Possibilities for similar applications are endless.

Write today for descriptive circular

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.

HOW THICK
is the thread in a
SPIDER'S WEB?



THE STURDY FILAMENT with which a spider moors its web is infinitely fine. Yet its thickness, if measured, would be in mere thousandths of an inch. There are Johansson Gage Blocks that are accurate within *two millionths of an inch*. A filament so fine as this would be invisible to the naked eye.

There is no counterpart in science or industry for the precision of Johansson Gage Blocks. For that reason they are accepted as the prevailing standard of measurement, wherever men work to infinite tolerances.

Ford Motor Company
Johansson Division
Dept. J, Dearborn, Mich.



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JOHANSSON
GAGE BLOCKS

H A N D Y A N D Y S A Y S

picked a pretty good slate for the coming year. Frank Curtis looks like a two fisted guy who gets things done, while Otto Winter is a seasoned veteran. And Hardinge Bros. beat the A.S.T.E. to the tape by electing Ray Morris vice prez first, so the gentleman from Hartford must have plenty on the ball. Anyway, Ray deals 'em face up, and that goes well by me. As for Faithful Frank Crone—well, it just wouldn't sound right if someone else were to read the Treasurer's report. Clyde Hause, of course, is definitely on the list of go-get-

ters, having run Detroit up from third division to the Cup. And, while I'm at it, a boost for Ford Lamb, another ex-Prex who made good in a big way. Oh, we're set for the coming year, the Membarometer invented by Connie Hersam being primed for 10,000, plus. On your mark . . . GO!

▼ ▼ ▼
Aaron E. Carpenter, who "near edits" the *Houghton Line*, gave the A.S.T.E. and the Tool Show quite a play in the previous issue of the Line. But in one of his articles, Aaron (we might as well

be chummy, considering that I've been reading the Line since about 1912, if not always agreeing) implied that we go the whole way and declare war on the Axis. Well, I think it would be the honest thing to do, but gosh! They don't declare wars any more, and besides, where would our boys fight? Heinie just won't play rough on the water, and the way things are going he'll have Europe sewed up tight by the time this gets to the readers. Anyway, why jump into big league stuff while our own minors are still squabbling among 'emselves? Which reminds me of the song: "What are the little grasshoppers doing, when one grasshopper etc". Well, these vital defense programs are doing to Uncle Sam what one playful grasshopper did to another, and if you ask me, I'd say it was time to call the foolishness off. Boys who tie up production at a time like this need a paddling, but Maw down in Washington can't seem to get her wedgies off and won't turn the job over to a guy with a man's size foot.

TANNEWITZ HIGH SPEED METAL CUTTING BAND SAWS

... a far Faster
Means of Cutting

TEMPLATES

from SHEET STEEL up to $\frac{1}{4}$ "

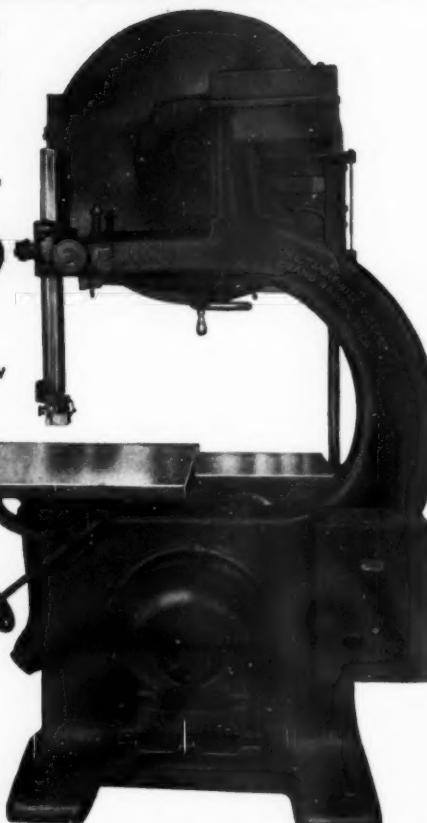
NON-FERROUS
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of all kinds up to 3"
thick — see chart below

SAVE THEIR COST
IN SHORT
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These superb machines, delivering over two miles of saw blade travel per minute without vibration, are doing hundreds of metal cutting jobs in a fraction of the time previously required, in metal working plants of every description throughout the country. To increase production and make important savings get the details NOW! A line requesting Metal Cutting Band Saw Bulletin will bring them to you promptly.

| KIND OF MATERIAL | THICKNESS AND SPEED PER SECOND IN INCHES | | | | | | | | | |
|------------------|--|---------------|----------------|-----------------|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|
| | $\frac{3}{16}$ | $\frac{1}{4}$ | $\frac{5}{16}$ | $\frac{3}{8}$ | $\frac{7}{16}$ | $\frac{1}{2}$ | $\frac{9}{16}$ | $\frac{5}{8}$ | $\frac{7}{8}$ | $\frac{9}{16}$ |
| MILD STEEL | 12 | 24 | 6 | 3 | 1 | | | | | |
| STAINLESS STEEL | 6 | 2 | 1 | | | | | | | |
| YELLOW BRAZING | 24 | 12 | 6 | 3 | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{5}{16}$ | $\frac{7}{8}$ | $\frac{9}{16}$ | $\frac{11}{16}$ |
| BRONZE OR COPPER | 6 | 3 | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{5}{16}$ | $\frac{7}{8}$ | $\frac{9}{16}$ | $\frac{11}{16}$ | $\frac{13}{16}$ | $\frac{15}{16}$ |
| ALUMINUM | 20 | 10 | 9 | 4 $\frac{1}{2}$ | 2 $\frac{1}{2}$ | 1 $\frac{1}{2}$ | 1 | $\frac{1}{2}$ | | |
| DURALUMINUM | 24 | 12 | 6 | 3 | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{5}{16}$ | $\frac{7}{8}$ | $\frac{9}{16}$ | $\frac{11}{16}$ |
| SILVER ALUMINUM | | | | | | | | | | |
| DRYBLE PLYMENT | | | | | | | | | | |
| PLYWOOD | 24 | 12 | 10 | 6 | 3 | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{5}{16}$ | $\frac{7}{8}$ | $\frac{9}{16}$ |
| ASBESTOS BOARD | 12 | 6 | 3 | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{5}{16}$ | $\frac{7}{8}$ | $\frac{9}{16}$ | $\frac{11}{16}$ | $\frac{13}{16}$ |
| FIBRE (HARD) | 24 | 12 | 6 | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{5}{16}$ | $\frac{7}{8}$ | $\frac{9}{16}$ | $\frac{11}{16}$ | $\frac{13}{16}$ |
| PAPER BOARD | 24 | 10 | 12 | 4 | 2 | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{5}{16}$ | $\frac{7}{8}$ | $\frac{9}{16}$ |
| MASONITE | 24 | 10 | 12 | 6 | 3 | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{5}{16}$ | $\frac{7}{8}$ | $\frac{9}{16}$ |
| BALKE-LITE | 12 | 6 | 3 | $\frac{1}{2}$ | $\frac{3}{8}$ | $\frac{5}{16}$ | $\frac{7}{8}$ | $\frac{9}{16}$ | $\frac{11}{16}$ | $\frac{13}{16}$ |



PERFECTLY SAFE: Two-wheel Lockheed Hydraulic Brakes automatically and instantly stop the wheels in case of saw blade breakage—completely guarded.

Incorporated in Tannevitz High Speed Band Saws are many highly developed, patented features found in no other band saws.

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"TRIPLE DUTY" LIVE CENTERS



• Interchangeable male and female inserts permit use with all kinds of centered and uncentered work.



- Work with heavier loads at higher speeds.
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IDEAL "UNIVERSAL" METAL ETCHER

- Four etching heads.
- Compact, everything enclosed.
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Three Other Models
Also Available

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ELECTRIC MARKER

- 7,200 cutting strokes per minute.
- Permanently marks on all materials, glass, metal, ceramics, etc.

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- Simplify balancing crankshafts, pulleys, fly-wheels, etc.
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The SOFT RUBBER binder CUSHIONS the abrasive

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Yes, and 5 times as fast as jig filing. These remarkably efficient files will cut your filing costs away down and produce finished jobs of which you will be proud.



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to fractions
of .0001"



By Operator

Precision bores gaged accurately and quickly with
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Comtorplug is a unique patented expanding plug gage with automatic features giving the same high precision no matter who uses it. Automatic 2-point gaging, self-aligning, self-centering. Not a passing reading. In fractional ten-thousandths, Comtorplug shows not only size but also out-of-round, front or back taper, barrel shape, etc. Reaches into shoulders and to very bottom of blind holes.

Widely used for ordnance
and airplane work.

Used by machine operators and by government and private inspectors wherever precision bores are required. Comtorplugs reduce spoilage and misfits, lower assembly time, improve quality of bores.

Comtorplug gages holes to fractions of .0001". Made for bores from $\frac{1}{4}$ " to 7" diameter and larger. Extra long inreaches available.

REQUEST BULLETIN 27



THE COMTOR CO. EST. 1928
70 Rumford Ave.

Waltham, Mass.

» » A. S. T. E. DOINGS « «

By IRWIN F. HOLLAND

Baltimore

On Wednesday, April 2, the regular monthly meeting was held at the popular Engineers' Club with 50 members and friends attending a fine steak dinner. Some of the A.S.T.E. members from Washington & Philadelphia were present.

Approximately 100 attended a very fine lecture given by Mr. E. W. Smith, Consulting Engineer, for the Lincoln Electric Company. Mr. Smith's subject was "Tools, Dies, Jigs and Fixtures". Slides were shown, illustrating the various phases of welding procedure and many applications indicating cost re-

ducing possibilities of improved methods of assembly. The surprise of the whole lecture was when Mr. Smith, by Polaroid light and celluloid models, demonstrated the structural characteristics of completed welded assemblies. This novel method of illustrating was really welcomed by all that were present, because by it you could easily understand, both the theory and practical end of Mr. Smith's lecture.

On Saturday, March 22, the first dance of the new year was held, with approximately 600 people attending—standing room only was again evident, and a few cases of "minor scalping" were uncovered. The dance was held at the Hotel Emerson in downtown Baltimore. Jos. E. Schirmer, Publicity Committee Chairman, acted as Master of Ceremonies. Mr. E. A. Isberg our very capable Entertainment Committee Chairman sang a few numbers which were welcomed by all. As usual, Ernie did a good job in handling all the dance details. Mr. Godfrey Steiner, Chapter Chairman, recently announced the new Committee Chairmen for 1941, which are as follows: W. L. Reynolds, Membership; J. E. Schirmer, Publicity; F. Bruggeman, Editorial; C. VanSant, Industrial Relations and A. W. Billman, Standards.

Boston

April meeting of Boston Chapter was held on the tenth at General Electric Co., River Works, Lynn, Mass. Southern fried chicken dinner was enjoyed by one hundred and ten members and guests and the meeting was attended by about one hundred and fifty.

Mr. R. D. Cunningham of Kendall Oil Co., was after dinner speaker and showed movies of auto racing at Salt Lake City. The speaker for the meeting was Mr. W. G. Robbins, President of Carboloy Company. He gave a very interesting talk on Carboloy uses in National Defense.

Buffalo

Buffalo Niagara Frontier Chapter held its meeting on April 3 attended by over one hundred members. After the dinner, talks were heard from a few of the members regarding their impressions of the Machine & Tool Progress Exhibition at Detroit. Congratulations were extended to Otto W. Winter, Past Chairman of this Chapter, on his election to the 1st Vice-Presidency of the National Organization.

new **T-J** HYDRAULIC CYLINDER *Catalog*



Types of Hydraulic Cylinder cushioning action are differentiated. Maximum allowable strokes per piston rod diameter are tabulated. Augmenting these and the cylinder specifications and dimensions are tables of pressures applied (for from 250 to 1500 pounds pressure p. s. i.) and practical hydraulic cylinder installation data.

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A TOOL OR MACHINE *for* PRACTICALLY *Every* REQUIREMENT

WRITE FOR NEW 1941 CATALOG OR TELL US YOUR PROBLEMS
AND WE'LL GLADLY DISCUSS THEM WITH YOU

THE OSTER MANUFACTURING CO., 2063 E. 61st ST., CLEVELAND, OHIO

—A. S. T. E. DOINGS—

The retiring officers received the congratulations of the entire membership for the gains and progressive accomplishments during their term of office. The Chapter has prospered not only financially, but under their leadership has increased in membership and prestige.

Following the reports and "Swan Songs" of the retiring officers and their committees, the newly elected officers: Allen C. Seigel, Chairman; Claire W. Crofoot, V. Chairman; William J. Noth, Secretary; and Frank Wilson, Treasurer, were installed for the forthcoming year by the outgoing chairman, George J. Keller.

After the close of the meeting a floor show was presented, composed of six selected acts from various night clubs from the Buffalo area, and of course,—liquid refreshments completed the evening.

California

In the belief that it would be a good idea to hear something of the shop problems, the Californians invited Mr. H. A. Herkner of Warner and Swasey Company of Cleveland, Ohio, to present a most unusual lecture at its meeting held April 10, at Scully's Cafe, in Los Angeles.

This lecture, prepared and produced by Warner and Swasey, is not a Sales-promotion plug. Rather, it will, if followed by all who are its intended audience, actually slow down the demand for all makes of turret lathes and other production metal-cutting machines. This Company states that the latent capacity of the nation's machines, if fully developed by proper understanding, would be adequate for a very substantial increase in our National production. The contention is that the small percentage of increase possible in the number of installations of turret lathes each year would be surpassed in productivity by the present machines, if they were properly used.

Going back to the "good old days" of grand-dad, a sound film, shows the healthy advances which have been made in the machines, in quantity and quality of work, to be sure, but demonstrates also the greater ease with which the modern machines operate with resultant increased happiness for the operator. Other features of the presentation were the elementary subjects such as grinding and setting tools for various operations, as well as speeds and feeds. Much of these matters was given by means of charts with lecture by Mr. Herkner.

Although intended primarily for newly-recruited shop men, this program for an hour engaged all the attention of about a hundred Tool Engineers who

"Ground from
the Solid
after
Hardening"

**SO
BIG**

A birthday cake lighted with Midget Milling Cutters helps to celebrate the tenth anniversary of the Severance Tool Company—a still growing service to the Metal, Wood, and Plastic Industries. The service that introduced Midget Milling Cutters to the field of rotary files; and which made possible "regrinding at low cost". The savings thru regrinding are more or less obvious in time, labor, and in money.

Tube Deburring Cutters and many other cutting tools designed and manufactured to special order, attest our growth of the past ten years.

In pausing to mention a birthday, we also wish to express our thanks to all those who have helped to make this very consistent growth possible. And we firmly believe that present-day industrial demands will broaden our vision and confirm the soundness of our policy to a point where we will be enabled to render greater service in the future.

R. M. SEVERANCE

**SEVERANCE
TOOL COMPANY**

Saginaw, Michigan

1522 EAST GENESEE AVENUE

—A. S. T. E. DOINGS—

were in attendance. Since a big percentage of these are comparatively young men, it is certain that many found that they had something to learn about tooling.

The newly installed Secretary, Mr. H. F. Lenz, gave an interesting report on the growth of the Chapter, showing the membership to be something in excess of two hundred. He also in a forceful manner impressed upon the men the vast importance of maintaining a real department of industrial relations for the purpose of connecting the right man with the right job by having available a list of jobs and a list of men who want jobs. Steps were taken to put this into



Dayton Awards Gavel to Retiring Chairman

Left to Right: State Senator Arch Barrett, Speaker; George A. Goodwin, Retiring Chairman, Dayton Chapter A.S.T.E.; Herman (Whitey) Pock, New Chairman; Harry Winter, New Secretary; and H. C. McMillen, new Vice Chairman.

**Another important reason
why G-F-P Presses set so
many production records**

The operator of a G-F-P Press has no push buttons to press, no levers or valves to operate by hand . . . he has both hands free *at all times* to handle the work. The G-F-P Press is controlled by foot pedal . . . the pressure applied to the work is always under instantaneous control of operator and varies in direct ratio to the

force he exerts on the foot pedal. It is impossible to damage the press by overloading.

Ask the nearest office to explain the many other features that also help G-F-P Presses establish such exceptional production records.

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Chicago—John Morley Davis—4125 Belle Plaine Ave. • Cincinnati—George H. Diers—4807 Yarmouth Place • Cleveland—The Cleveland Duplex Machinery Co., Inc., Penton Bldg. • Detroit—McKee-Kenyon & Co.—1627 W. Fort St. • New York—Triplex Machine Tool Corp.—125 Barclay St.

GENERAL Flexible POWER PRESS

effect without delay. Grape vine reports that a number of vacancies were listed before the conclusion of the meeting go to prove something or other about co-operation.

Central Penna.

The Central Penna. Chapter of York, Pa., held their regular monthly meeting at West York Inn on April 8. The dinner was well attended. A short business session was held, after which a sound moving picture was shown. This picture described the Manufacture and Uses of "Neoprene"—a synthetic rubber product.

A projected slide showing the manufacture of small compressors used in refrigeration and air conditioning equipment was shown before visiting the York Ice Machinery Corporation to see these small compressors produced in their up-to-the-minute production set-up.

The visit through the plant was very interesting, and the discussion scheduled to be held at the completion of the shop tour was called off because all the available time was used up by the groups in questioning the various production set-ups. The DeWalt Products in Lancaster and the American Chain and Cable Company were well represented at this meeting.

Elaborate plans are progressing for the "Chief Executive Night" meeting which will be held May 13. The speaker for this meeting is one connected with the National Defense set-up and will speak on that subject. He is also one of the chief exponents of the Nationally known "York Plan" of cooperative manufacturing for defense production.

Plans are also being formulated for an Annual "Picnic" to be held sometime in June.

Cleveland

"The Cleveland Chapter No. 3 held one of the largest regular meetings of the year Friday, April 4th at the Hotel Allerton. It was attended by 160 mem-

—A. S. T. E. DOINGS—

bers and guests for dinner and more than 275 for the technical session.

The technical session started immediately following the dinner and Lt. Frank J. Long of the Cleveland District Ordnance Dept. was the first speaker. He gave a nomenclature of the various ordnance department technical terms and a description of the various shells.

Three other speakers gave short talks following the ordnance discussion. These talks were on sandblasting, cleaning, and painting of the high explosive shells.

The headline attraction of the evening was the lecture given by Myron S. Curtis on the machining of the high explosive shells. This talk was illustrated by slides and gave us some very enlightening facts on the subject.

All in all this was not only one of the largest meetings but also one of the most interesting. Everyone in attendance was well pleased with the entire meeting and a good many of the guests have since applied for membership."

Dayton

The April meeting of the Dayton Chapter was held at Gibbons Hotel on April 14. The meeting was opened by the retiring Chairman, Geo. Goodwin, who reported on the Directors' meeting at Detroit, after which the new officers were sworn in and "Whitey" Pooch took over. His first act was to present the retiring Chairman with a hand-made Lucite gavel as a token of appreciation from the membership for services rendered.

The dinner speaker was State Senator Arch Barrett, who gave some interesting highlights on the activities of the State Legislature along with a few good "Pat and Mike" stories.

This was followed by an "Ask-it Basket" quiz. During dinner, each member present was given a blank headed "Ask Something To Enlighten" with a list of the "Experts" who would answer their questions. The questions provoked some good discussions and while not all were answered by the alleged "experts" everyone had an opportunity to participate.

Chairman Pooch announced a very complete and interesting program for the balance of this year.

Dayton Chapter will celebrate its third anniversary on June 12th at the Gibbons Hotel by holding a combined meeting with the Dayton Chapter of SAE. The principal speaker will be A. T. Colwell, National President of the Society of Automotive Engineers and Vice President of Thompson Products, Inc. of Cleveland who will present as his topic, "Behind The Scenes in National Defense Engineering".

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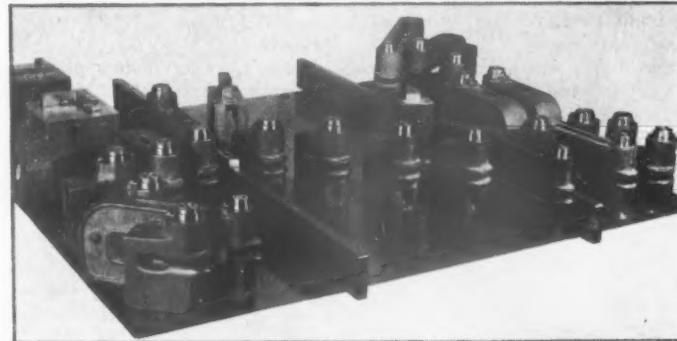
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when punching holes and cutting notches in flat sheet metal parts. Change from one operation to the next or from one part to another

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Mr. Colwell's development work on important engine and chassis parts brings him into close contact with the engineers who design and produce aircraft, tanks, motor vehicles and other automotive equipment required for national defense. This, plus frequent trips to Europe (including one just before the outbreak of hostilities) and a West Point background, enables him to correlate authentic engineering progress with our defense needs.

American ability to vie with production of the totalitarian powers both in quantity and quality will be analyzed

and compared by Mr. Colwell. It is his belief that the techniques known to American Industry, backed by its experience, make possible potential production that will outstrip anything that has been accomplished overseas.

The meeting will open at 5:30 P.M. with cocktails and dinner and Jack Blair promises a bang-up time for everybody.

Detroit

Again, Chrysler Motors played host to Detroit Chapter, the "M-3" Transmission and the "Fluid Coupling" being

the magnets which drew some 425 Tool Engineers to the Chrysler Highland Park plant for the April meeting. A good dinner was served, after which retiring Chairman Clyde Hause presented the incoming staff of Chapter officers. Ford Lamb, who was present, swore in Lee Diamond, Clyde Mooney, John Feiten and Gus Centmayer as Chairman, Vice Chairman, Secretary and Treasurer, respectively. As a matter of fact, the boys just stepped up a notch, promotion deserved because of the fine work done during '40. Clyde Hause, as you all know, graduated into the National Secretaryship. During the ceremony of installation, Ford Lamb came in for an enthusiastic hand, a deserved tribute to his splendid work in promoting the Society.

Due to press of time, the scheduled talks were considerably abbreviated, then, the entire gathering was taken for a tour through the new Chrysler Engineering laboratories, beyond doubt one of the finest and most completely equipped in the world. Then, the "Fluid Coupling" Division, where the boys were shown the gamut of operations and assemblies required to produce the latest in driving convenience.

Mr. H. R. Matheny, Chrysler Vice President and operating manager, gave an address of welcome. He also presented Mr. L. C. Sassenhausen, Gen'l. Supt. of the Fluid Coupling, Div., and Mr. Kimberly speaker. The tour, in which Mr. Matheny took a lively interest, was in charge of Mel Stewart, and group guides outlined the various items of interest. Detroit Chapter is indebted to Chrysler Motors for an evening at once inspirational and educational.

Hartford

Monday evening, April 7, the Hartford Chapter again turned out in large numbers to hear Mr. Malcolm Judkins, Chief Engr. of the Firth-Sterling Steel Company give an illustrated lecture on cemented carbides. This always fascinating topic was extremely well handled by Mr. Judkins who not only illustrated the method of manufacture, but dealt at length on its various applications as well as points to consider in the design of the tool itself.

The temporary chairman for the evening was Bob Englund, whose donation of a door prize, a pair of micrometers, lent its flavor also to the meeting.

The new officers for the year were duly sworn in by the newly elected 2nd Vice President of the National Society, our own Ray Morris. The officers are as follows: Chairman, Henry Moore; Vice Chairman, Willson Fenn; Secretary, Henry Hauck and Treasurer, Carl Moeller.

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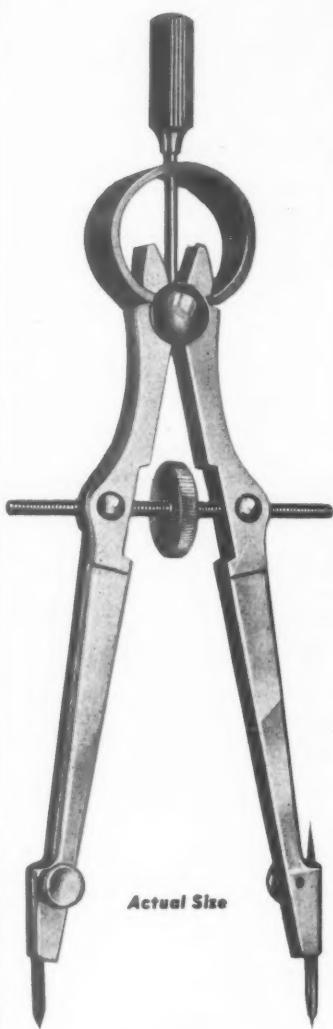


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New York-New Jersey

The New York-New Jersey Chapter April meeting set an all-time high record for attendance at their meeting at the Alexander Hamilton Hotel. The meeting was labeled "Wright Aeronautical Night" of the Chapter, and a feature of the evening was the presentation of a technical address by Howard B. Cook, co-ordinator of industrial training at Wright Aero. on the crankshaft of the Wright double-row Cyclone aircraft engine. A disassembled crankshaft of the powerful 14-cylinder Wright engine was on display for the purpose of illustrating Mr. Cook's lecture. In addition to employees of the Wright Company, representatives from every machine shop in the area were present. The meeting was the first held in Paterson by the Society.

Another feature which was enthusiastically received was the showing of a newly-made moving picture portraying the various steps in the construction of a Wright engine, from the foundry, through machining operations, assembling and testing. The narration was by H. E. Linsley of the Company.

Newly-elected officers of the Chapter were installed as follows: Chairman, Frank Oliver; Vice-Presidents, Stanley Greechacz, and Remo Rege; Treasurer, Frank L. Delhagen and Secretary, B. C. Brosheer.

O. W. Brown, Assistant Works Mgr. of Wright Aero, was named Chairman of the Constitution and By-Laws Committee and Charles Bazaz, of production engineering Department, will head the Entertainment Committee.

Frank J. Sciro, Secretary to Mayor Furrey, gave a message of welcome on behalf of his chief who was unable to be present. He stressed the "ever cordial hospitality which Paterson extends to visitors."

Among the distinguished guests introduced were: Myron B. Gordon, Vice President and General Mgr. of Wright Aero; A. F. Jackson, Industrial Engr. of A. E. Clark Co.; Kenneth E. Sutton, General Superintendent, Wright Aero; A. M. Sargent, President and General Mgr. of Pioneer Engineering Co.; W. S. Reid, Service Department, Wright Aero; C. C. King, Treasurer, Wright Aero; Maj. William McKiernan, United States Air Corps Inspector; Henry Panke, General Shop Superintendent, Wright Aero and Paul Bastian, Production Mgr. Wright Aero.

Rochester

Forty members sat down to a dinner with music at the popular Hotel Sagamore on Wednesday April 16. The guest speaker was newly elected National President, Frank W. Curtis, who was

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accompanied by Second Vice President, Ray Morris of Hartford. After dinner the boys convoyed themselves up to the University of Rochester for the meeting proper. Mr. Curtis accorded an interview to the press, and with Vice President Morris and Chairman Lucas, submitted to the news photographers.

Chairman Lucas introduced Mr. Curtis who commented on the Society, its purpose, and the ends he hoped could be achieved during the coming year.

Mr. Morris then took the floor and paid a splendid tribute to the memory of old friends "Doc" Roller, formerly

of the Camera Works, and William T. Morgan formerly of Taylor Instrument. Mr. Morris then emphasized the importance of Chapter co-ordination in respect to the functioning of the various duties of the officers proper. He specifically recommended the spreading of the work, pointing out that by following this procedure the Chapter is bound to profit by discovering much talent among other members.

Chairman Lucas then resorted to the "police line-up method" of introducing his Board of Directors to the membership. Among the 193 guests and mem-

bers present was a sizeable representation from the I.B.M. Training School, Mechanics Institute, and Edison Technical High School bodies.

The nominations of Chairman Lucas and Frank O'Brien for Regional Director were presented by the Nominating Chairman, John Dense. Charlie Seely of I.B.M. and Chairman of the Entertainment Committee reminded the members of the coming April 25 Bowling Party as well as the June 15 picnic.

Dynamic National President Frank Curtis launched into a talk on jig and fixture design by making the point that two identical lathes doing identical work but in different localities resulted in one of the two showing superior performance. This difference was attributed to the superiority of tooling on one of the two machines. The importance of design principle, particularly in the ability of the Tool Engineer to recognize the problem from this perspective was a point well made.

Mr. Curtis's slides included good and bad examples of practices used in welding, fixture, clamping, locating, supporting, as well as Vee blocks and milling practices and were highly informative for those on the job and particularly for the student guests.

Some time was devoted to tungsten carbide with emphasis on the proportions of the tip in respect to dimensions as well as proper support for deflection resistance.

Localized hardening via the induction method followed by a lively question period concluded this most instructive address by Mr. Curtis.

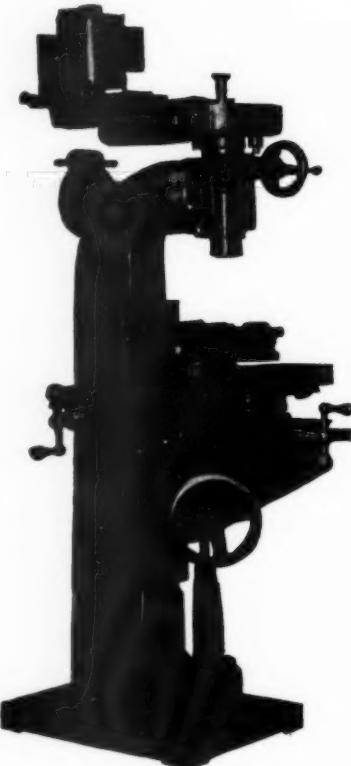
Rockford

The Rockford Chapter held its meeting on April 3 at the Faust Hotel. The meeting opened at 5:30 with inspection of a display of Model Airplanes of the more recent makes. These models were timely and provoked considerable discussion and interest. Dinner was served at 6:30 and was followed by installation of new Chapter officers and appointees and talks by Kenneth Lund and E. W. Dickett with Henry Ruehl officiating. Mr. Lund gave a resume of the Annual Directors' Meeting at the National Machine and Tool Exposition in Detroit. Then, came Mr. Dickett's word picture of the Exposition as a whole, and what a picture. His audience of approximately 135 was spellbound as he described the marvels of the show.

It was announced by the Program Committee that the May Meeting would be in the form of a Plant Visitation, the time and place to be named at a later date. Then, there was the announced plan for the Annual A.S.T.E. Stag to be

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—A. S. T. E. DOINGS—

held June 21 at one of the many Golf Links around Rockford.

The main lecture of the evening took place before an audience of about 250 members and guests with Mr. M. W. Petrie, of the Production Research Department of the Chrysler Corporation, being introduced by Chairman, Henry Ruehl. Mr. Petrie's talk dealt with superfinish for the aircraft industry and was accompanied by movies of several California plants. It was certainly most interesting.

The meeting was the last technical meeting of the season and climaxed a season of educational and enjoyable meetings.

Entertainment was furnished by Sundstrand Machine Tool Company of Rockford—"The Swing Trio."

Schenectady

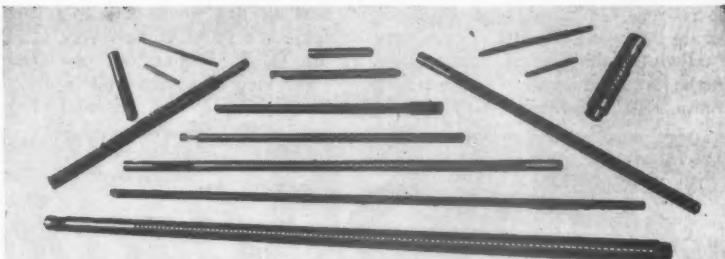
The Schenectady Chapter held its April Dinner Meeting on Monday, April 14, and their members had the honor of being addressed by their new National President, Frank W. Curtis, Chief Engr. of the Milling Machine Division of the Van Norman Machine Tool Company.

Mr. Curtis talked on the subject of "Tool Engineering as Applied to Jigs and Fixtures" and with the aid of slides discussed the basic principles of a good fixture design. "Tool Engineering" said Mr. Curtis, "is one of the most important functions in a manufacturing plant because the product can be no better than the tools used to build it. A good Tool Engineer must be progressive in his ideas and constantly on the alert to improve on existing designs". He pointed out that standardization is highly important and illustrated many possibilities in the standardization of fixture parts that would result in reduced costs, but warned against the danger of, too strong an emphasis of standardization, resulting in less progressive design.

Rigidity in the design of the fixture holding the part was also emphasized and should never be sacrificed to minimize material cost. One of the most important phases of design is the incorporation of principles which consider practical operating conditions and result in a tool which may be operated with a minimum of effort.

Mr. Curtis also showed pictures of special designs used in high production work in Defense Industries which served as a fine example of the contributions Tool Engineers are making toward the success of the program for National Defense. He also spoke briefly on the development and application of tungsten carbide cutting tools and showed a few applications of induction hardening methods used by his Company. In his

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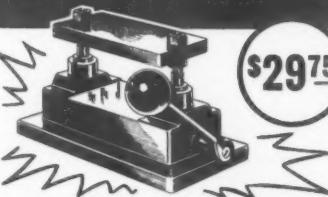
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opening remarks, Mr. Curtis commented on the activities of the local Chapter, emphasizing the importance of smooth functioning committees and cooperation of the membership. He also complimented the activities of the National Committees and outlined the rapid growth of the Society during the past year.

The business meeting was opened by the retiring Chairman, Fred H. Diehl, and the following Chapter officers were installed for the coming year by Mr. Curtis: A. Schuneman, Chairman; H. Crump, 1st. V. Chairman; C. E. Smart,

2nd V. Chairman; A. M. Reynolds, 3rd V. Chairman; N. Y. Coxe, Secretary and R. H. Wilke, Treasurer.

Upon turning over the gavel to the new Chairman, Mr. Diehl was given a vote of appreciation by all present for the fine job he has done during the past year in guiding the activities of the Society.

Mr. Schuneman announced that the next meeting would be held at Howard Johnson's in Albany on May 12, 1941. Mr. O. W. Winter, our new National First Vice President who is also Vice Chairman of the National Defense

Training Committee, will address the group on the subject of "Defense Training."

St. Louis

The St. Louis Chapter held its regular monthly dinner meeting Thursday, April 10, at the Melbourne Hotel, with around 100 members in attendance. During the business session, Chairman Burnside emphasized the fact that St. Louis had been signalized honored by being selected as the place to hold the National Annual Spring Meeting next year. He stated that committees will be in operation in the next few days and that most of the arrangements will be completed before Fall.

Entertainment Chairman Doogan reported on the bigger and better Picnic to be held July 12. The technical session opened with a sound movie entitled "The Magic of Modern Plastics." This picture covered injection and other methods used in the production of today's plastics. Following the sound film, the members were entertained by a talk and movie by Mr. W. R. Rennert of the Curtiss-Wright Corporation, on the subject, "China—As I saw It."

Syracuse

The attendance for the April meeting of the Syracuse Chapter was a fine tribute to the speaker of the evening. Mr. Frank Curtis, Chief Engr. of Van Norman Machine Tool Company and National President of the A.S.T.E. Mr. Curtis gave an excellent talk on jig and fixture design, pointing out that this phase of tool engineering is probably the most important. He elaborated on factors influencing choice of type of fixture, principles of design, varieties of fixture clamps and jacks, and covered the special tooling requirements when using carbide tools. Mr. Curtis's talk was supplemented with slides showing details of design and examples of tool installations.

The technical talk was preceded by a dinner and business meeting. At the suggestion of Joe Owens the members gladly joined in the song, *Down on the Farm*. It was sung over and over each time using the name of a different Tool Engineer. At the business meeting the important event was the installation of the new officers. Ray Adams is our New Chairman, Clayt Ainsley is Vice Chairman, Ray Wands is Treasurer, and Ray Cose is Secretary. The Chapter expressed its appreciation to the retiring officers for their faithful service. We are sure that the new slate also will have a successful tenure.

Ray Morris of the Hartford Chapter and 2nd National Vice President was also a guest. He made a brief talk point-

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If production barriers are cropping up in your plant due to lack of enough machinery—

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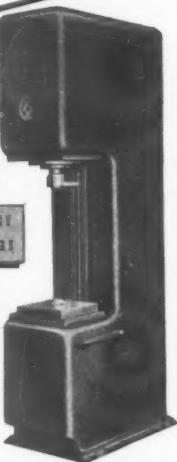
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ing out the value of the A.S.T.E. in our national economy. His remarks showed his personal enthusiasm for the Society. The Chapter will welcome another visit from both of these men.

Toledo

The Toledo Chapter installed its new officers at the Hillcrest Hotel on April 14 with one hundred twenty-one Tool Engineers, guests and friends in attendance.

The new officers are Lloyd Kelley, Chairman; Walter Ulrich, Vice Chairman; George Sisley, Secretary, and Claster Collwell, Treasurer.

Following the dinner an excellent entertainment program was presented under the auspices of Mr. Seeman of the Entertainment Committee. Mr. Lamb then gave a brief talk about the Society and its activities after which he installed the new officers. The meeting was then turned over to the Speakers' Chairman, Mr. Bok, who introduced the toastmaster of the evening, Mr. Charles Swartzbaugh, who then took over the activities. The evening's guests, Mr. Palmer, Mr. Snowberger, Mr. Gulmueller, Mr. Donkel, Mr. Schutz, and Mr. Padgett, were introduced by the toastmaster. Lieutenant Col. Roland B. Lee, acting adjutant of Ohio, gave a very timely talk on preparedness and the Tool Engineers' place in the present emergency. This turned out to be one of the most successful meetings of the year.

The Toledo Chapter has grown to such an extent that it is difficult to find a place large enough to hold its dinner meetings, and if the growth of the Toledo Chapter continues, somebody will have to build a new hotel.

Western Michigan

The Western Michigan Chapter held its April meeting in the Occidental Hotel in Muskegon on the 14th. The supper meeting, was attended by 75 members and their guests. A poll was taken of the members who had attended the 1941 Machine Tool Progress Exhibition. It was found that approximately 90% had attended and were well pleased with the way the Show and the shop tours were handled. After the regular meeting, Mr. Randall, the program Chairman, introduced the speaker of the evening, Mr. W. B. Scott of the Ampco Metal, Inc. His subject "Aluminum Bronzes and Their Uses" was illustrated by first a movie and then a short lecture, which he illustrated with slides. His talk was very well received and brought out several questions, as to the uses of aluminum bronzes.

We were also honored with the presence of Mr. T. Lord of Hartford, Conn., and Mr. H. Avery of Detroit, both mem-

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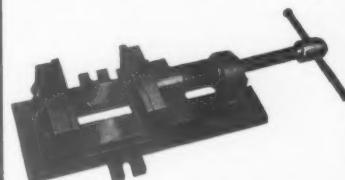


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P-3 is available in external right or left discharge models, flange-mounted and immersed models.

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A. S. T. E. DOINGS

bers of A.S.T.E. A vote of thanks was given the Muskegon members for the splendid way in which they handled the meeting.

Worcester

The April Meeting of the Worcester Chapter was held at Putnam & Thurston's on April 7 with 100 members and guests sitting down to another of those good dinners.

During the meal, Miss Florence Holmes from the town of Leominster played the accordion and sang. She then proceeded to reveal hidden talent and the first discovery was Ralph Nutting of the Heald Machine Company who really outdid himself in leading the boys in a song. Then, Stanley Bath of tap fame untapped his favorite song and next came "Shine on Harvest Moon" by tiny Henry Merrill who, by the way, had just bought a new Mercury one hour before. The real surprise of the evening was the rendering of two Irish songs by Mr. Sidney Beard who has a real tenor voice.

With the usual ceremony, Mr. Ray Cole installed the slate of officers consisting of Mr. C. J. Lindgren, Chairman, Mr. Leslie Goff, Vice Chairman, Mr. W. O. Aldrich, Treasurer, and Mr. Charles Banks, Secretary. We voiced the wishes of all the boys in the Chapter in extending our thanks and appreciation to Mr. Ray Cole for a job well done. Ray, this does not mean you are on the retired list as we want to see you at the meetings just as before because we will need your advice and help and some night will you try to get Mr. Ed Taylor to come down too. He is still in Worcester, is he not?

There were about 135 present and Mr. Lindgren introduced the speaker of the evening, Mr. W. G. Robbins, President of the Carboloy Company who gave a very interesting talk on the Defense Program and what the carbide tools are doing for defense. He explained how Germany in 1936 and 1937 was using carbide cutting tools on practically all types of cutting, whereas here in the United States and in England, they were being used only on cast iron and bronzes and at the same time Germany was ordering in double the amount of tungsten that they were using each year so that a surplus was being accumulated. During 1936-7 and 8, about 17,000 lbs. of tungsten a year were being used in the United States and Canada by the manufacturers of carbide tools, whereas they are now using about 10,000 pounds per month and Mr. Robbins predicts that this will increase to 25,000 lbs. per month in the near future.

The tungsten used by the carbide

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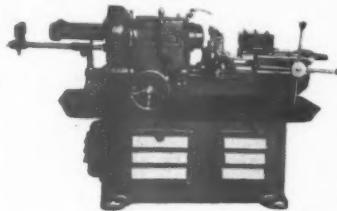
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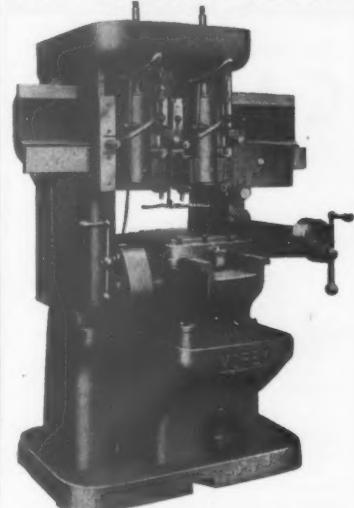
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manufacturers, however, is a very small part of the tungsten supply brought into the U.S. and Canada; in fact, at the present time, it only consists of 2%, whereas in the future it is expected that the carbide manufacturers will use about 4% of the total tungsten supply.

Mr. Robbins explained how standardization has helped to reduce the cost of the carbides and at the present time 90% of all the carbide tools are made of four grades and of those four grades, two of them do most of the work, that is, one for cast iron, and one for the steels. Mr. Robbins also illustrated with slides the two shapes that have been standardized and used by the greater portion of the trade. Mr. Robbins was given a rising vote of thanks for a very interesting and instructive evening.

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**Hamilton Chapter
of A.S.T.E. Chartered**

The American Society of Tool Engineers continued its phenomenal growth with the chartering on April 17 of a new chapter at Hamilton, Ontario. Chairman of the new chapter, which has 43 charter members, is W. A. Dawson of the Otis Fensom Elevator Company.

Other officers are Joseph Little, 1st Vice Chairman, Tool Supervisor, Mc-Kinnon Industries; Charles A. Fisher, 2nd Vice Chairman, Plant Manager, Pratt & Whitney; Edward L. Greer, Secretary, Manager, Canadian Fairbanks Morse Co.; and H. C. Coit, Treasurer, Asst. Tool Room Foreman, Canadian Westinghouse.

**A.S.T.E. to Remit
Dues to Draftees**

Members of the American Society of Tool Engineers who are inducted into service will not have to pay dues for the period they are in service, it was announced recently by Frank W. Curtis, newly elected president of the society. Action towards this end was taken by the Board of Directors at its annual meeting.

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THE Passing Parade

R. S. Marthens, formerly manager of the Westinghouse Gearing Division, has been appointed Staff Assistant to the Manager of the Canton Ordnance Division, it has been announced by F. D. Newbury, Vice President of the Company. Except for two years service in the Air Corps, Mr. Marthens has been with the company since 1917.

E. B. Nisbet, formerly Purchasing Agent and Treasurer, has been made Executive Vice President of the Laminated Shim Company, Glenbrook, Conn. E. R. Young becomes Vice President in charge of Production.

Gisholt Machine Company of Madison, Wisconsin, has announced the appointment of The Mine and Smelter Company, Denver, Colorado, as exclusive sales agent in the Rocky Mountain region. They will handle the complete line of turret lathes, automatic lathes, and balancing machines.

Clark Stillman Judd has been named president of the American Brass Company, Waterbury, Conn. Mr. Judd, who has served as vice president of the company since 1929, succeeds John A. Coe, Sr., president since 1920, who becomes chairman of the board of directors. Other officers named to fill existing vacancies are: Arthur H. Quigley who succeeds the late Clifford F. Hollister as executive vice president; Edwin J. Rockwell, who takes over the positions of secretary and treasurer also held by the late Mr. Hollister; W. Kenneth Daly, controller; Charles E. Steele, assistant secretary and John A. Coe, Jr. and Mr. Quigley, new members of the board of directors.

Arthur H. Starrett, vice president and general manager of the L. S. Starrett Company in Athol, Mass., has been named a national defense coordinator for his area.

Patrick J. McGarty, 69, has retired after 50 years service with the Rhode Island Tool Co., Providence. McGarty, a polisher, was presented a new watch by William C. Dart, president and Harry K. Cross, secretary-treasurer of the company.

Norton Company, Worcester, Mass., has appointed Harry E. Howard assistant production manager, abrasive division; Ralph H. Lundberg, in charge of job evaluation and Swen Pulson, in charge of visitors, foreign plant correspondence and miscellaneous factory matter. Lundberg and Pulson will be under the vice president in charge of manufacture.

Earle J. Van Buskirk has been elected a vice president of Landers, Frary &

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Clark, New Britain, Conn. Francis Dabney has been named controller, a newly created position and William H. Hansen has been advanced to the position of assistant secretary.

William J. Eberlein, who for 18 years has been in the sales department of the Greenfield Tap & Die Co. in various parts of the country, has returned to Greenfield, as assistant general manager of sales, according to C. C. Zeigler, vice president in charge of sales. Eberlein's post, a new one, and a promotion, will keep him in the home offices.

Dean F. Willey has been appointed general mechanical superintendent of the New York, New Haven & Hartford Railroad, succeeding the late Albert L. Ralston.

Forest S. Baster, chief engineer of White Motor Company, Cleveland, has been elected vice president in charge of engineering. He is succeeded in his former post by Robert Cass who formerly was executive engineer. Mr. Baster is a graduate of the Case School of Applied Science and entered the automotive field with Packard Motor Company in 1919. He joined the White Staff in 1936.

W. M. Albaugh, formerly treasurer, was elected vice president in charge of replacement divisions, and J. D. Wright, formerly secretary, was named secretary-treasurer in a recent meeting of the directors of Thompson Products, Inc.

Died

Edwin H. Marble, 87, president of Curtis & Marble Machine Company and of the Fremont Casting Company, Worcester, Mass., died April 16. In 1886 he was placed in charge of engineering work at the Curtis & Marble plant and became a vice president of the company. He became president of both companies in 1910. He invented numerous machines and processes connected with the textile industry.

Harold T. Merriman, 71, president and director of the American Wringer Co., Woonsocket, R. I. died April 11 after a week's illness.

Edward B. Taylor, 82, retired personnel manager at Wickwire Spencer Steel Company, Palmer, Mass., died April 3 at St. Petersburg Fla., after a short illness.

Gifford Kingsbury Simonds, 60, president and general manager of the Simonds Saw & Steel Co., died March 26. Mr. Simond's association with the company began in 1900.

Horace J. Davis, 77, president of the Kingsbury and Davis Machine Company, Concord, N. H. died recently at his home in Coontoocook, N. H.

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MAY MEETINGS

BOSTON—May 15. Dinner 6:30 P.M. Walker Memorial Building, Massachusetts Institute of Technology. Technical Session Room 10-250 M.I.T. Mr. Warren Ames, President of the B. C. Ames Company, and Mr. L. W. Macomber, Head of Standardizing Dept., General Electric Company, will speak on the subject, "Discussion of Indicators and Measuring Devices."

GREATER NEW YORK—May 12. Technical Session 8:00. Governor Clinton Hotel, 31st & 7th Ave., N.Y.C. F. O. Hoagland, Master Mechanic, Pratt & Whitney, will speak on "Precision Jig Boring."

HARTFORD—May 5. Dinner 6:30 P.M. City Club of Hartford. Dr. Igor I. Sikorsky will talk on "Present and Future of Flying." Major Fitch, General Chairman of New England's Flying Cadets will also give a talk. Mr. A. H. d'Arcambal will be technical chairman for this meeting. Reservations must be made early.

MILWAUKEE—May 8. Dinner 6:30 P.M. Hamann's Restaurant, 3865 N. Richard Street. At 8:00 P.M. there will be a visit to the Seaman Body Plant, Division of Nash-Kelvinator Corp.

ROCKFORD—May 8. 1:00 P.M. Annual plant visitation of the Nash Motors, Kenosha, Wisconsin. Members only. Reservation: Send card or phone Main 6270.

SCHENECTADY—May 12. Dinner 6:30 P.M. Howard Johnson's Restaurant, 739 Central Ave., Albany, N. Y. Mr. Otto Winter will speak on Defense Training.

ST. LOUIS—May 8. 6:30 P.M. Melbourne Hotel, Grand & Lindell Blvds.

SYRACUSE—May 13. Dinner 6:30 P.M. Meeting 8:00 P.M. Syracuse Industrial Club. Three speakers will talk on the following subjects, "Gauging and Tolerances" and "Use of Gauges from the Standpoint of Low Production". An open discussion on the entire subject of Gauges will follow.

TOLEDO—May 12. Dinner 6:30 P.M. Toledo Yacht Club. Mr. H. F. Stose of the Owens Illinois Glass Company will give an illustrated lecture on the subject, "History of Plastics". Reservations: George B. Sisley, 134 Poinsettia Avenue, KI. 4727.

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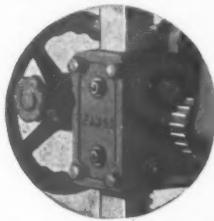
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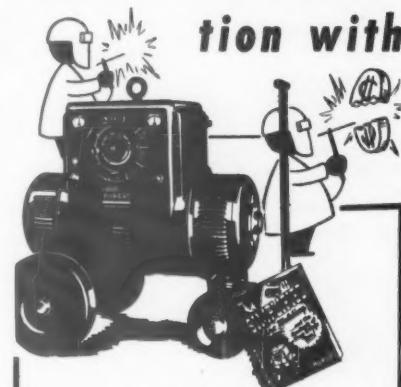
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| Famco Machine Co. | 113 | Norton Company | 22 |
| Firth-Sterling Steel Co. | 8 | Oilgear Company | 67 |
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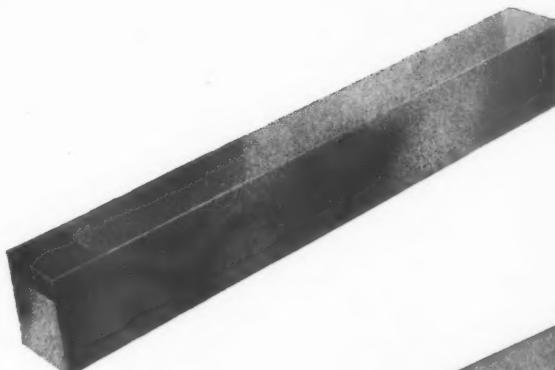
Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.



Right—200 Series

Tool No. Shank Size

| | |
|-----|--|
| 200 | $\frac{3}{4} \times \frac{3}{4} \times 2$ |
| 201 | $\frac{5}{8} \times \frac{5}{8} \times 2\frac{1}{4}$ |
| 202 | $\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$ |
| 203 | $\frac{7}{16} \times \frac{7}{16} \times 3$ |
| 204 | $\frac{3}{2} \times \frac{1}{2} \times 3\frac{1}{2}$ |



STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.



Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

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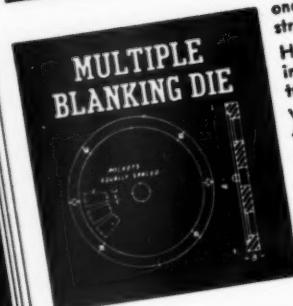


Probably the best test for determining the resistance to wear of any tool steel is to place it in service as a metal spinning roll. Such rolls should be free from surface fatigue which results in spalling or checking. The structure of the Graphitic Steels is ideal for this application.

There is no tendency to seize the metal being formed and the resultant product is satisfactory in every respect. Graph-Sil, heat treated as explained below, gives remarkable performance, using a working hardness of 64/65 Rockwell C.

When $A = 4"$
 $B = 1"$
 $C = \frac{3}{4}"$ Quench in brine from 1450°F. Temper at 250°F. for four hours.

When $A = 8"$
 $B = 2"$
 $C = 1\frac{1}{2}"$ Quench in brine from 1475°F. Temper at 250°F. for six hours.

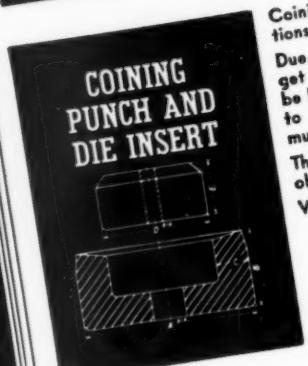


This die must withstand the impact of at least twenty punches, applied at one time to produce perforations uniform in shape and location in blanked strip circles ranging in thickness from $1/8"$ to $7/16"$.

Here is a decidedly non-uniform section that presents a problem in hardening. It must have practically no change of dimension, no warpage after heat treatment and the blanking edges must be wear resistant and free from spalling. We recommend Graph-Mo with a working hardness of 55 Rockwell C. obtained as follows:

When $A = 8"$
 $B = 1"$
 $C = \frac{1}{4}"$ Heat to 1500°F. Quench in oil. Temper at 700°F. for four hours.

When $A = 16"$
 $B = 1\frac{1}{2}"$
 $C = \frac{1}{2}"$ Heat to 1550°F. Quench in oil. Temper at 700°F. for eight hours.



Coining of metal is generally admitted to be one of the most drastic operations to which dies, tools and equipment are subjected.

Due to high stresses set up in the die assembly, it is necessary in order to get a satisfactory number of coined parts that the steel used for this assembly be highly resistant to failure by fatigue. It must be capable of being hardened to a sufficient depth to withstand the high pressures without sinking, and must be free from any tendency to spall or fracture.

The recommended working hardness for Graph-Tung is 63/64 Rockwell C. obtained as follows:

When $A = 4"$
 $B = 2\frac{1}{4}"$
 $C = \frac{3}{4}"$
 $D = 2\frac{1}{2}"$
 $E = 1"$ Quench in brine from 1450°F. Temper at 400°F. for four hours.

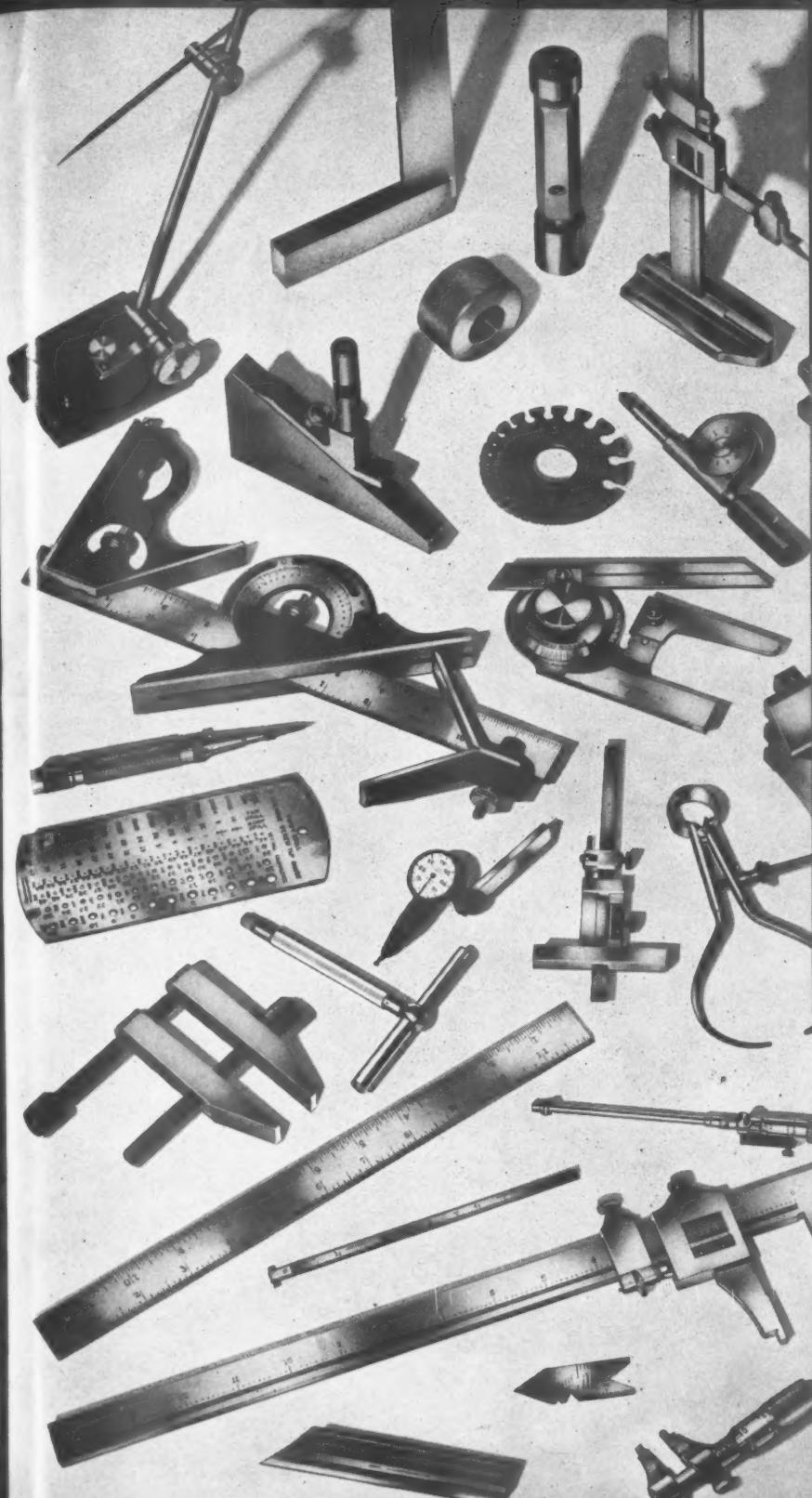
When $A = 6"$
 $B = 4"$
 $C = 1"$
 $D = 4"$
 $E = 1\frac{1}{4}"$ Quench in brine from 1475°F. Temper at 400°F. for six hours.

Graphitic Steels are unsurpassed for their resistance to abrasion or wear. Further information available upon request.

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